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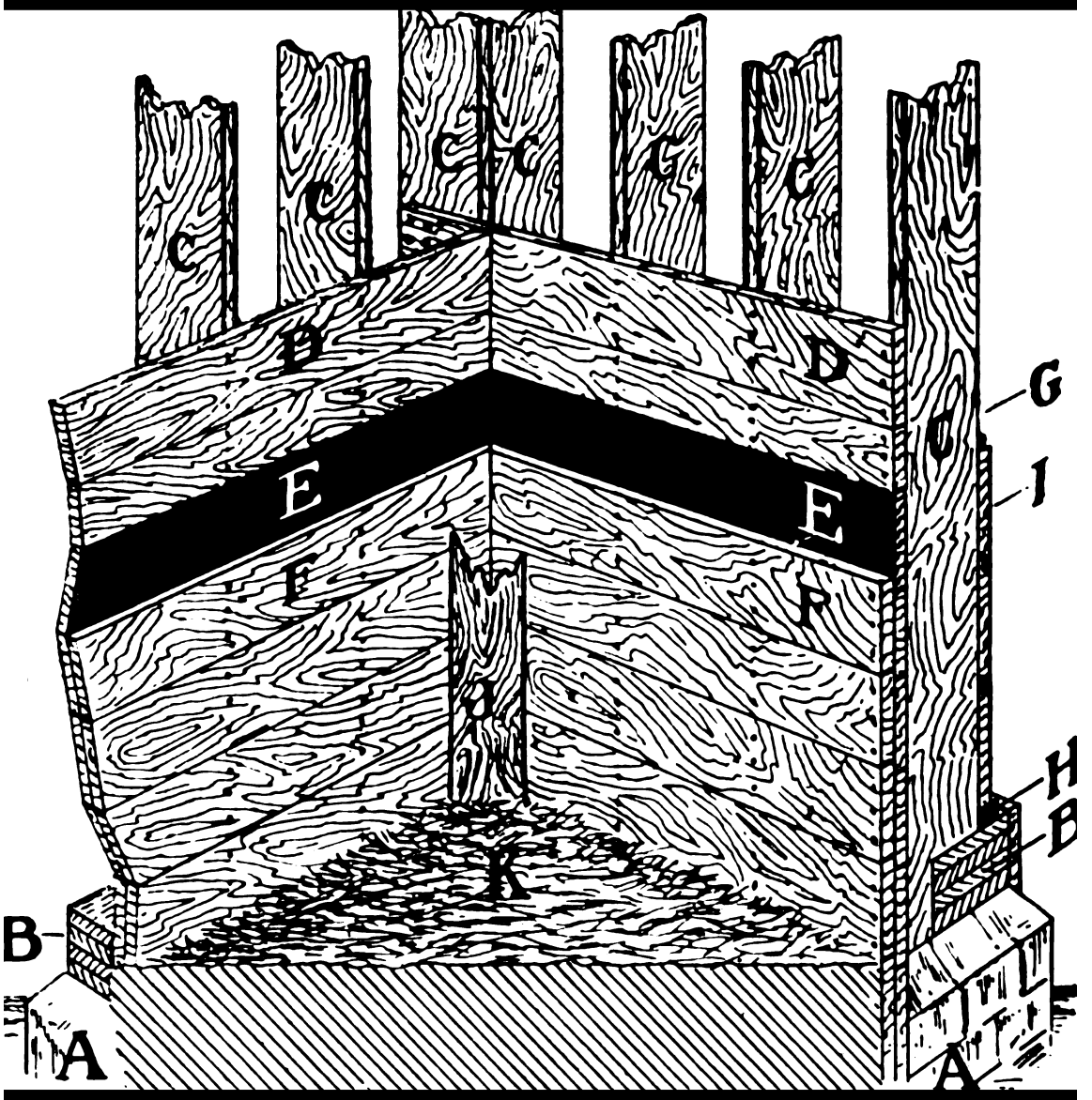


# *Report of the Dairy Commissioner*

Canada Dairy and cold storage Commissioner

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APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE.

# FIRST ANNUAL REPORT

OF THE

# DAIRY COMMISSIONER

FOR THE

# DOMINION OF CANADA.

(AFFILIATED WITH THE CENTRAL EXPERIMENTAL FARM.)

REPORTS OF

JAS. W. ROBERTSON, DAIRY COMMISSIONER,—OTTAWA;
J. C. CHAPAIS, ASSISTANT DAIRY COMMISSIONER,—ST. DENIS, QUE.;

FOR

## 1890.

*PRINTED BY ORDER OF PARLIAMENT*

OTTAWA:
PRINTED BY BROWN CHAMBERLIN, QUEEN'S PRINTER & CONTROLLER OF STATIONERY.
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Hon. J. G. Bourinot

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# APPENDIX

TO THE

# REPORT OF THE MINISTER OF AGRICULTURE

BEING

# REPORT OF THE DAIRY COMMISSIONER.

---

OTTAWA, 30th January, 1891.

To the Honourable
The Minister or Agriculture,

SIR,—I have the honour to submit the First Annual Report of the Dairy Commissioner for the Dominion of Canada.

The initiatory movement which afterwards led to the creation of the Office of Dairy Commissioner, had not that purpose in view at its commencement. To give permanency to a record of the occurrences which led on to that end, a brief statement of them is introduced here. By a series of letters to the press, Mr. W. H. Lynch, of Danville, Que., who had acquired a wide and honorable reputation through his book "*Scientific Dairy Practice*," began an agitation in favor of the organisation of a Dairymen's Association for the Dominion of Canada. That culminated in the assembling at Ottawa of delegates from all the Dairymen's Associations in the several provinces on 9th April, 1889.

## CONVENTION AT OTTAWA.

By the courtesy of the Speaker of the House of Commons, the meetings were held in one of the committee rooms. The following Associations were represented:—

The Dairymen's Association of Western Ontario;

The Dairymen's Association of Eastern Ontario;

The Dairymen's Association of the Province of Quebec;

The Creameries' Association of Ontario;

The Dairymen's Association of Nova Scotia;

The Dairymen's Association of Manitoba;

The Provincial Farmers' Association of New Brunswick.

Mr. H. S. Foster, Knowlton, Que., was chosen provisional president, and Mr. J. de L. Taché, Quebec, was elected secretary of the meeting.



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After discussion a resolution was unanimously adopted in favor of the organisation of a *Federal Dairy Association.* A committee on organisation was formed by the appointment of the gentlemen whose names follow:—

Messrs. D. M. Macpherson, Louis Beaubien, W. H. Lynch, J. C. Chapais, E. Casswell, P. B. de la Bruère, Ed. A. Barnard, and Major Boulton.

At a subsequent session the following recommendations of the committee were adopted:—

I. "The name of the new association shall be: 'The Dairymen's Association of the Dominion of Canada.'"

II. "The aim of the Association shall be to promote the general interests of the dairy industry in the Dominion of Canada."

III. "In order to become a member of this Association it shall be necessary for the applicant to be a member of one of the regular District or Provincial Associations, except in the case of Senators and Members of the House of Commons who shall be *ex-officio* members of the Association."

IV. "The Association shall be under the control of a President, a Vice-President for each of the Provincial Associations, a Secretary, a Treasurer, and three Directors for each of the Provinces of the Dominion, in conformity with the Act of Incorporation, all of whom shall compose a Board of Directors of the Association, and report to the said Association at its general meeting."

(This recommendation was afterwards amended by allotting four Directors to Ontario and four to Quebec.)

The election of the Officers of the new Association was proceeded with and resulted in the choice of:—

*President:*—Mr. D. M. Macpherson, Lancaster, Ont.

*Vice-Presidents:*—The Presidents of all the Provincial Dairymen's Associations.

*Secretary:*—Mr. J. C. Chapais, St. Denis, Que.

*Treasurer:*—Mr. H. S. Foster, Knowlton, Que.

DIRECTORS.

*Ontario:*—

Mr. Wm. H. Eager, South Mountain, Ont.
Mr. James Haggarty, West Huntingdon, Ont.
Mr. E. Casswell, Ingersoll, Ont.
Mr. Thos. Ballantyne, M.L.A., Stratford, Ont.

*Quebec:*—

Hon. Louis Beaubien, Montreal, Que.
Col. Ora N. Patten, Brome Corners, Que.
Mr. M. Bernatchez, Montmagny, Que.
Prof. Ed. A. Barnard, Quebec, Que.

*New Brunswick:*—

Mr. Julius N. Inches, Fredericton, N.B.
Mr. Arthur C. Fairweather, Rothsay, N.B.
Mr. George Fawcett, Sackville, N.B.

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*Nova Scotia :—*

Mr. L. C. Archibald, Antigonish, N.S.
Mr. Paul C. Black, Falmouth, N.S.
Mr. John McKeen, Mabou, Cape Breton, N.S.

*Prince Edward Island :—*

Hon. Alexander Laird, Bedeque, P.E.I.
Hon. D. Ferguson, New London, P.E.I.
Mr. John Hamilton, New Perth, P.E.I.

*Manitoba :—*

Major Boulton, Shellmouth, Man.
Prof. S. M. Barré, Winnipeg, Man.

*North-West Territories :—*

Mr. J. P. Dill, Wolseley, N.W.T.

At a later session it was " moved by Major Boulton, seconded by Mr. E. Casswell, and resolved that the Government be requested to appoint a *Dairy Commissioner*, whose duty it shall be to watch over the interests of the dairy industry of the Dominion of Canada. Carried unanimously."

## Agricultural Committee.

On the morning of the second day of the Convention, an invitation from Mr. Peter White, M.P., Chairman of the House of Commons Committee on Agriculture, accorded the Association the privilege of laying its views before that committee at one of its sessions.

Messrs. D. M. Macpherson, Louis Beaubien, D. Derbyshire, E. Casswell, Ed. A. Barnard and Jas. W. Robertson addressed the committee and answered enquiries from its members.

Action was taken by the Committee on Agriculture, as set forth in the following resolutions, which were adopted unanimously :—

" Moved by Mr. Thos. S. Sproule, M.P., seconded by Mr. Samuel R. Hesson, M.P., and resolved : ' That in view of the extension and importance of the dairy industry of Canada, and the necessity of protecting its interests, the Committee thinks it its duty to recommend the appointment of a Dairy Commissioner, whose duty it shall be to watch over and promote, as far as possible, the progress of the different branches of this important part of the national industry.' "

" Moved by Mr. S. A. Fisher, M.P., seconded by Mr. Alex. McNeil, M.P. and resolved : ' That the Committee has learned with satisfaction of the organisation of the Dairymen's Association of the Dominion of Canada, and is of opinion that, considering the general advantages which must be derived from the labours of this Association, and the extensive programme which it has to go through, every possible encouragement should be afforded to it.' "

## Deputation to the Government.

During the evening of the second day, an audience was granted by the Premier, the Right Honourable Sir John A. Macdonald, and the Honourable Messrs. Carling Mackenzie Bowell and Costigan, to a deputation from the Association.



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Messrs. T. S. Sproule, M.P., and Adam Brown, M.P., introduced the members composing the deputation and also spoke in favour of the requests which were afterwards preferred by Messrs. Macpherson, Foster, Lariviere and Prof. Robertson.

Rt. Hon. Sir John A. Macdonald discussed the matters presented to his notice. In effect, he intimated that he was well acquainted with the progress of the dairy industry in the Dominion of Canada; he knew that its success was identified with the welfare of the farmers in large areas, and therefore as it prospered it became a promoter of national prosperity; he knew that the manufacture of cheese had been improved more than that of butter-making, and he advised the new Association to try to improve the butter produced in the Dominion; he recognized the probable usefulness of a *Dairy Commissioner*, and would confer with his colleagues on the advisability of appointing such an officer. He asked Prof. Robertson to submit to him a memorandum on the matters which had been presented by the deputation.

The following is a copy of the memorandum which I had the honour to prepare and submit:—

## Memorandum of the arguments presented by the Deputation from the Dairymen's Association of the Dominion of Canada, who had the privilege of waiting upon the Right Honourable Sir John A. Macdonald, G. C. B., Hon. John Carling, Hon. Mackenzie Bowell and Hon. John Costigan, for the purpose of urging upon the Government;—

1, The desirability of granting a sum of $3,000 to the said Association to be used by it, to aid in the further extension and profitable development of the dairy interests of the farmers of Canada; and

2. The advisability of appointing a Dairy Commissioner for the Dominion of Canada.

The deputation considered itself most happy in being privileged to bring the wishes and needs of the Dairymen's Association of the Dominion of Canada before the Government by an interview with two of its illustrious members, the Right Honourable Sir John A. Macdonald and the Honourable John Carling, Minister of Agriculture, who are everywhere known as taking a deep interest in all that concerns the welfare of the agricultural community.

It would be superfluous to recount the unequalled importance of the Agricultural interests in the Dominion. However, occasion is taken to very briefly remind the Government of the great value of dairy husbandry to the farmers and all classes of the population. Dairy farming as a branch of Agriculture is becoming more fully recognised as the permanently profitable method of obtaining satisfactory returns from farm products, without exhausting the fertility of the fields.

The Dairy Industry as represented by the 1,300 odd co-operative cheese and butter factories of the Dominion is not the least of our manufacturing interests.

Since it is the farmers' special sphere, in the following of their occupation, to provide food and the raw material for clothing for the rest of the race, whatever enables them to do these best thereby operates for their profit and benefit.

(*a*) Dairy farming increases the available food supply per acre. Taking for illustration the wheat crop, it is evident, that not more than half the possible life-sustaining value of the crop resides in the flour prepared for human food. The other parts of the crop—the straw, the chaff, and the bran—which are unpalatable, unsuitable and indigestible for man, can be profitably fed to dairy animals and by them transformed into milk, butter, cheese or beef. In that way, from the one crop largely, by the use of cows, the farmers are able to provide both bread and butter.

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(*b*) Dairy farming enables farmers to sell their labour and their skill to more advantage, while retaining the substances of plant food in the soil. When wheat, to the amount of one million of bushels, is exported, at least $240,000 worth of the fertility of the fields has been removed in the grain. Whereas when fine butter, to the value of one million of dollars is exported, not more than $750 worth of these valuable elements of plant food has been taken from the country.

(*c*) Dairy farming provides remunerative occupation for a larger agricultural population. Since population alone gives value to property, dairy farming when generally engaged in, increases the value of all properties in the locality.

(*d*) By means of dairy farming, the fertility may be restored to exhausted soils and those of virgin richness may be saved by it from becoming barren or impoverished. Instances of that beneficial result, from the method of farming that is being recommended, may be cited from those counties in Quebec and Ontario that have extensively engaged in dairying. The condition of the lands in many other sections, where a sufficient number of cattle to consume the fodders and coarse grains have not been kept, is full of admonition and warning for the settlers in the Western Territories and Manitoba.

(*e*) Dairy farming enlarges the earning power of land per acre. By it the farms are made to be more of the nature of mediums through which the farmers are able to dispose of their labor and skill to advantage, and less of the nature of mines to be bagged up, piecemeal, aud their virtue shipped off to other lands.

(*f*) Additional marketable value is thus also put into the lands devoted to such uses. Already it is safe to state that a suitable farm situated within three miles of a cheese factory or butter factory will sell for $10.00 per acre more than the same farm or one like it would bring, twenty miles distant from either of these factories.

(*g*) The direct cash income of the farmers is added to, from milk butter cheese, beef and pork, without any lessening of the possible receipts from sales of cereals. A smaller acreage under cultivation will give a larger return in grain. The thoughtful improvement of dairy cows will make it possible to grow steers and produce beef at less cost. When a cow leaves a fair profit direct from sales of her milk product, her calves can be reared at less expense than when the whole milk of the cow of inferior milking power is consumed by her offspring.

(*h*) Dairy farming encourages and promotes co-operation among the farmers for their mutual profit. The confidence thus inspired in each for the others, begets a desire for the exchange of information and judgments on all other matters relating to agriculture. The Farmers' Institutes, which are now so popular all over this continent, are largely the outgrowth of the co-operation of dairymen, and they are everywhere found at the very front in that work.

(*i*) In the rearing and feeding of stock, there is offered scope for the application of the highest order of intellect to farm work, and thus a love for agricultural pursuits may be generated in the minds of boys, who would otherwise flock to join the ranks of city denizens who are less sure to aid in their country's development and in the securing of a competence for themselves.

(*k*) Dairy farming can be a hopeful means towards consolidating the factions of the Dominion into one prosperous, contented, progressive people.

(*l*) The dairy industry has done more to adequately and successfully advertise the nature of our country as one desirable to live in, than all other exports or advertising matter. The wonderful success of the Colonial and Indian Exhibition in giving millions of English people an object lesson in the variety and excellence of our farm products, merits a reference in this connection. Unquestionably much of that gratifying success was due to the energy and tact of Sir Charles Tupper. The exhibition of dairy products contributed not a little in winning a favorable judgment towards Canada from many desirable emigrants.

(*m*) While dairy farming had in it such capabilities to serve our country well, both at home and abroad, it languished until Provincial Dairymen's Associations were formed to foster its development. These associations in Quebec, Ontario, Manitoba and Nova Scotia, through means of conventions and the employment of experts,

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have sought to bring to light a knowledge of better methods of how to make richer fields, more suitable fodders and crops, more productive cows and improvement in the ways of managing, feeding and caring for stock as well as in the processes of manufacturing and handling the product. By contributions of information, encouragement has been given to backward districts, and enthusiasm in the extension of the business has been created.

What these Associations in the several provinces have done and are continuing to do for the individual farmers and counties, it will be the opportunity and purpose of the Dominion Association to do for the several provinces.

(*n*) It will provide the channels for the passing on to other provinces of the discoveries, improved methods and appliances of each, through the medium of annual conventions, reports and otherwise.

(*o*) It will circulate for the benefit of farmers from time to time, information upon the constantly arising new needs and demands of the several markets for dairy products. Thus a work equally helpful and needful, but in no way trespassing upon the work of the Provincial Associations, would be done. The Presidents of the several Provincial Associations are the Vice-Presidents of the Dominion Association.

(*p*) It will receive reports from exporters upon the general excellencies or defects of the products sent abroad every year, and endeavour to disseminate such information as will enable dairymen to perpetuate and further improve the good qualities and to eliminate the bad qualities by removing or remedying the faults or the causes of such.

(*q*) It will become an easy and effective medium for the communication to the producers, of the proper preparation that shall be made for market, to ensure the best returns. In the matter of butter packages alone, either the apathy or the inability of merchants to bring about the adoption and use of only safe, neat and attractive-looking packages entails a very considerable loss to the country annually.

(*r*) The use of judicious newspaper and other literature to dispel prejudices still existing in some markets against Canadian dairy products as compared with those of English and Danish make will be undertaken by the Association. As a matter of fact, Canadian Cheese is still often sold under the name of English Cheddar. The extra price thus realized from the consumer, does not come to our people.

(*s*) By way of illustrating what has been done in regard to cheese and the possibilities of the market for fine butter, it may be cited that because we manufacture over 99 per cent. of all our cheese in co-operative factories, we are able to send from the Dominion about one third of all the cheese which Great Britain imports from abroad. Mainly because we manufacture less than 3 per cent. of our butter in creameries, does it follow that we furnish to Great Britain less than 2 per cent of all the butter she imports; and Great Britain imports altogether about two and a half times as many dollars worth of butter as of cheese.

(*t*) The Dominion Dairymen's Association will seek to foster and develop the butter trade of the country. No endeavour will be made or should be made to displace the cheese industry by a butter one. Our Country is exceptionally well fitted for the production of cheese during the summer, even if not so well situated as many other and competitive countries for the production of butter for export during that season. It is possible to develop the butter making industry during the winter months to as great magnitude and with more remunerative profits to agriculturists than arise from summer dairying. The possibilities of cheap and suitable winter feed by the use of ensilage, have been so well and satisfactorily demonstrated that now, milk can be produced at less cost during the winter than upon pasture only during the summer. In the winter season, the average price of butter is almost twice as much as during the summer. Safe transportation can be economically provided for, during the cold weather.

(*u*) Thus large sums of money, paid by England to European countries for dairy products, could to an agreeably appreciable extent be diverted to our Dominion in exchange for pure fine butter manufactured in creameries here during the winter.

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(*v*) A minor but still valuable advantage from the development of such winter dairying, would be the remunerative employment of the farm workers for the whole year.

For these and other reasons, that might be set forth, a grant of $3,000 is respectfully asked to enable the Association to overtake the work outlined. The expenses of the Convention, which has been in session here for two days, have been paid by the individual delegates and members so as to save the whole of the sum which may be voted for the uses already specified. Through the assistance rendered by local Associations and the enterprise and skill of our citizens, Canadian Cheese stands to-day first in reputation for superior quality. The countries competing with us, in the food markets of the world, are alive to the advantages of that reputation which is alike creditable and commercially valuable to our Dominion.

(*w*) The Danish Government has afforded generous aid to the farming population of that country, in the way of legislating for the prevention of the adulteration of dairy products.

The Legislature of the State of New York last year voted $82,500 for the work of its Dairy Commissioner and Dairymen's Association. Their avowed endeavour is to beat Canada on the British markets. Other States have also provided large annual grants for the same purpose.

(*x*) To be able to hold our own, there is indeed need for a capable Dairy Commissioner.

(*x*2) The practice of slightly adulterating the milk furnished to cheese factories is all too prevalent. From a series of returns received from cheese factories last year, the reports set forth that the managers of these factories thought that eight per cent. of the total number of *patrons* furnished milk of doubtful quality.

(*y*) A Dairy Commissioner who could drop or send unexpectedly into any locality, would effectually deter many individuals from indulging in slightly dishonest practices.

(*z*) The detection and prevention of fraud upon the great number of honest farmers by a few persons in the community, would confer a benefit upon the whole agricultural interests of the Dominion. The action of the Dairy Commissioner would operate to prevent wrong doing and thus largely obviate the need for the infliction of penalties.

(*a*2) The Dairy Commissioner under the direction of the Minister of Agriculture could also be very useful in aiding the Dominion Dairymen's Association to foster, develop and extend the dairy interest of Canada with special reference to furnishing information as to adequate and suitable transportation facilities, the opening up of new markets and the dissemination of knowledge regarding the opportunities and needs of all available new markets. As a case in point, it is already a matter of report, I believe also of fact, that Danish butter, by way of England, has been sent across our continent *viâ* the Canadian Pacific Railway for Japan. Canadian producers should be able to acquire and occupy that market. A little timely information to producers at home and consumers abroad would stimulate and direct the enterprise of commerce to a trade that would be of great value to us.

(*b*2) The Dairy Commissioner could disseminate to the best advantage, the information of real value to dairymen that will arise from the working and investigations of Dominion Agricultural Experiment Stations.

The two points submitted for early and favourable consideration and action, are $3,000 for the Dairymen's Association and the appointment of a Dairy Commissioner.

Officers of the Dairymen's Association of the Dominion of Canada are :—

President.—D. M. Macpherson, Lancaster, Ont.
Secretary.—J. C. Chapais, St. Denis, Que.
Treasurer.—H. S. Foster, Knowlton, Que.
With Vice-Presidents and Directors from each Province.

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APPOINTMENT.

Afterwards I had the honour to be informed by direction of the Minister of Agriculture that an Order in Council had been passed, by which I was appointed Dairy Commissioner for the Dominion of Canada, and also Agriculturist of the Central Experimental Farm at Ottawa. The Order in Council referred to, states that: "In view of the great importance to Canada of the Dairy interest, and the fact of the very great extension of both production and trade found to arise from improved methods of manufacture, particularly in cheese, in the Province of Ontario, it is advisable to appoint a Dairy Commissioner, to be affiliated with the Central Experimental Farm at Ottawa, for the purpose of diffusing practical information among the farmers of the Dominion, by means of bulletins, conferences and lectures on the most improved and economical methods of manufacturing butter and cheese, and of feeding cattle to produce the best results in obtaining milk."

My appointment took effect on 1st February, 1890; and from that date I entered upon the discharge of the duties devolving upon me as *Dairy Commissioner* for the Dominion and *Agriculturist* of the Central Experimental Farm. By the kindness of Prof. Saunders, Director of Dominion Experimental Farms, I was relieved from most of the work and responsibility as *Agriculturist* until the work of the *Dairy Commissioner's* office should be organised and set agoing in the different provinces of Canada. A brief report of my work in the capacity of *Agriculturist* will be found in the Report of the Central Experimental Farm; and for the sake of clearness and the better service of those who may seek information and guidance from its pages, the matter of this Report is arranged under the following heads.

I. Second Convention of the Dairymen's Association of the Dominion of Canada.
II. First visit to address Conventions in Nova Scotia and New Brunswick.
III. The work of travelling Dairy Inspectors and Instructors.
IV. Second visit to lecture in the Maritime Provinces.
V. Manitoba, North-West Territories and British Columbia.
VI. Dairy Bulletins.
VII. Standards for Milk and Legislation in reference to Adulteration.
VIII. A Distinctive Canadian Brand.
IX. Boards of Trade.
X. Experimental Dairy Stations.
XI. Butter-making in Winter.
XII. Mind and Muscle on the Farm.
XIII. The Establishment of Cheese Factories and Creameries.
XIV. Report of the Assistant Dairy Commissioner, Mr. J. C. Chapais, St. Denis, Que.

I have the honour to be,

Sir, your obedient servant,

JAS. W. ROBERTSON,

*Dairy Commissioner.*

## I.—SECOND CONVENTION OF THE DAIRYMEN'S ASSOCIATION OF THE DOMINION OF CANADA.

The second convention of the Association was held in the City Hall, Ottawa, on Monday, Tuesday and Wednesday, 17th, 18th and 19th February 1890.

Addresses were delivered by His Excellency the Governor-General, Lord Stanley of Preston, Hon. John Carling, Minister of Agriculture, Prof. Wm. Saunders, Director,

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Experimental Farms, Prof. I. P. Roberts, Cornell University, N. Y., Messrs. D. M. Macpherson, Ed. A. Barnard, A. A. Ayer and myself as Dairy Commissioner. Many of the Members of Parliament attended the sessions of the Convention, and took an active part in the discussions. A full report of the proceedings was published; and as Parliament ordered 50,000 copies for the use of its Members, a wide distribution was made. A limited number of copies of that report are still available at this writing, and I shall be pleased to send free one copy each, as far as they will go, to farmers who apply for them. The presence of His Excellency, the Governor-General who honoured the Convention with an address at one of its sessions, was the compliment of a statesman to the dairy interests of Canada and also to the farmers of the Dominion. Upon every occasion when reference has been made to the event, at meetings of agriculturists, it has called forth renewed manifestations of the heartiest appreciation. In order to give a wider publicity to, and a better acquaintance among farmers with the keen thoughtful and competent interest, which the representative of Her Majesty takes in the details of their occupation and the ways by which it can be bettered, the address of His Excellency, Lord Stanley of Preston, is given here in full.

ADDRESS BY HIS EXCELLANCY THE GOVERNOR-GENERAL.

"MR. PRESIDENT AND GENTLEMEN:—Your President has asked me to say the traditional few words. I demanded of him whether I might take refuge under the rule—a very wise rule—which says that after the addresses the speakers are to limit themselves to five minutes. He, with a kindness for which I am not duly grateful, declines to give me an answer on that point, and therefore, if I transgress that limit I hope you will put the blame on the right shoulders. It is with great pleasure that I find myself present at your Convention. I think, in these days, the advantages of such meetings as this, and of such Associations as yours, are undisputed. In the first place, through co-operation of this kind you obtain a large range of experience under the differing conditions both of climate and of soil, and the other circumstances under which each individual farms. In the second place, you obtain better information than is accessible to a private individual; and thirdly, perhaps, but not the least, you obtain a power of collective action in all matters which affect the dairy interest, whether for good or evil. I understand the object of this convention to be the bringing together from the different Provinces of the Dominion those who are interested in matters relating to the dairy industry. As the representative of the Sovereign, I need not say that I consider such a meeting to be of primary importance and therefore as Her representative, and understanding that there was nothing of a political character in your meeting, I readily and heartily consented to attend. It is a sincere pleasure, indeed, to me to be among those whom I might venture to call 'brother farmers,' for when in England I was closely connected with what was largely an agricultural constituency for over twenty years, and I also have had, though in a minor degree to yourselves, some practical experience on these subjects which are of a common interest. I am here to-night rather as a learner than as a teacher. I can only listen to the experience of those who address you. But there seem to me to be certain points upon which even an outsider might venture to say a few words. In the first place, it is of the greatest importance that we should obtain, through the medium of this convention, better information as regards all matters relating to the dairy trade, not only as regards the practice of farm work, which applies to yourselves, but also as regards (and this applies to those who are interested in farming generally) what is going on in the outside world. Now, in explanation, I would say,

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"for instance, as regards the information which is obtained by interchanging opinions "at such meetings as this, the attention of men is drawn to such questions as the class "of stock that are most suitable to be bred, what is the best mode of their treatment "under different conditions of climate, and along with all, that no man can listen to "what passes between practical men without picking up something which may help "to inculcate those habits of accuracy, of cleanliness, of attention to details, which one "and all will admit go far to making dairy farming what it is. For my part, as "having bred cattle in former days, I would lay great stress upon the first con- "dition of breeding good cattle rather than bad. Travelling through the length "and breadth of this land, as I had the pleasure of doing recently, any one must be "struck with the great agricultural progress made in a limited period of time. Still "one cannot help being also struck by the very large amount of indifferent, and "positively bad stock, which one sees in some places. Indeed, I have been in dis- "tricts where it seemed to me as if people had collected all the points which a "breeder would object to, and tried to put them together in one animal. Happily "that is the exception—by no means the rule; but let it be the object of your con- "vention, among other things, to blot such a state of affairs out of existence. In "the next place, I would press upon your attention the importance of the factory "system. I have a few figures which will show the great importance of the trade "in dairying products, and they also indicate that while the exports under the head- "ing of cheese are very gradually and largely increasing I am sorry to observe "exactly the reverse must be said of the butter trade. I think it was a pregnant "remark of your President's just now, one which suggested a great deal, that "whereas in the cheese trade the factory system has become largely predominant, "in the production of butter it is exactly the reverse. In the days before the fac- "tory system was known at home it was said so much depended on the individual "exertion of the cheese-maker or dairy-maid, that it used to be a common saying, "'If you want good cheese marry your dairy-maid.' It meant this: that those who "were primarily concerned should be those who had a direct interest in the process "which had to be carried out. But we have improved on that, on this side of the "water. The factory system, so largely adopted, has tended to that regularity, "accuracy and the general advantage which accrue from any process being carried "on on a large scale instead of on a small one, and undoubtedly that is having the "effect, among other causes, in promoting public interest in the cheese trade. I "venture very humbly to back up what your President has already said with regard "to the consideration whether it cannot be further pressed in relation to the manu- "facture of butter. I have spoken of information to the farmers themselves; I "spoke also of that as between the farmer and what I may call the outside world. "I think it is good for people to know, not only what they are doing themselves, "but also what others are doing, and especially in these days of easy communica- "tion and extended markets, people should have a knowledge of what is going on "around them. If I wanted to put it concisely, I would say, especially to those in "the export trade: find your market, suit your market, keep your market. A "market may be near, and the higher-priced classes of butter, unsalted, &c., may find "a market close at hand. On the other hand, however, for the majority of the "people, and at all events for some years, it seems to me that the distant markets "will be those to which we must look. It is remarkable what can be done by a

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"little careful attention to details. Denmark, a comparatively small country, by "no means a rich country, possessing over the rest of Europe no advantages of cli- "mate and soil, by great attention to details, scrupulous care and a considerable "amount of science, has place herself in a relatively high position in the European "market, and I am sorry to say, to the displacement of many neighbors who should "hold their own better than they do. As regards suiting your market, consider "that you have to look at not only your own mode of manufacture but that you have "also to suit those to whom you have to sell. Now, with great respect, I cannot "help repeating what I have heard elsewhere, and I have seen evidences of it here "in this country, that perhaps not enough care is taken as regards a good deal of the "butter which is exported. Speaking generally, a bad article costs as much to "carry as a good one; and in these days, when you have to meet competition in "distant markets, especially, by a better quality than can be found upon the spot, "too much stress cannot be laid upon the necessity for improving the quality of our "products. Cleanliness and care in packing have a good deal to do with that. The "French have gained a good reputation by the care in which in the dairies of Nor- "mandy and the northern Provinces of France, they suit the market to which they "are sending. There is a great difference in making up packages in an attractive "form, and I suppose even to the wholesale purchaser there is nothing like having "something to please the eye in thus making your goods attractive. But I am sorry "to say that in many cases those who are sending to market do not pay enough "attention to this, the result being, for instance, in the case of a mixed sample or "bad packing especially in butter, that the consumer eats bad butter and the pro- "ducer eats up his own profits.

"Closely allied to the question of market is the delicate question of rates on your "freight. I am not going to ask you to embark in any controversy on that point. "In the last office which I held in the mother country, I had occasion to deal with this "question as a Minister—with the question of railway rates, especially as affecting "agriculturists. I can only hope that I fulfilled my duty, that I made the best com- "promise that was possible, because I have always heard that the best definition of a "compromise is to get yourself abused by the parties on both sides, and judging by "that, the compromise which I effected must have been satisfactory. But there is "undoubtedly a difficulty in the even adjustment of rates. Speaking generally, I "should be inclined to say what pays the farmers, in the long run, will pay the rail- "way companies also, and I think a great deal can be done by the collective action "of a Convention, such as this, in bringing to bear the light of better information, and "the weight of public opinion, upon those who have to carry the goods which you "produce. I ought to say, with regard to collective action, what I meant by that "was, that a convention such as this speaks with great authority as the mouthpiece "of a particular branch of the farming interest. It speaks to the Government or "Parliament; it affords you better means for dealing with large bodies, such as rail- "way companies, transportation companies, &c., and is also able, if it uses its wisdom "intelligently, to speak with great authority upon questions such as those affecting "the laws relating to contagious diseases among animals, &c. On all these things "there is a great work before you. As regards the importance of the question, not "that for a moment I doubted it, but because I wish to inform myself fully as to the "extent of the export dairy trade of this country, by the kindness of the Government

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"statistician, and of the Deputy Minister of Agriculture, I am furnished with a list "of figures showing the export of butter and cheese during the past ten years.

"These figures, for convenience, I will ask you to take as read, only quoting a "few of them now in illustration of what I have to say:

DOMINION OF CANADA—Exports of Dairy Products—Home Production.

BUTTER.

| Year. | Quantity. | Value. | To Great Britain. | To United States. | To France. | To Germany. | Other Foreign Countries. | B.N.A. Provinces. | British Indies. |
|---|---|---|---|---|---|---|---|---|---|
| | Lb. | $ | $ | $ | $ | $ | $ | $ | $ |
| 1868.... | 10,649,733 | 1,698,042 | 544,707 | 1,015,702 | ..... | 1,496 | 14,870 | 95,777 | 26,986 |
| 1880.... | 18,535,362 | 3,058,069 | 2,756,064 | 111,158 | ..... | ..... | 24,710 | 163,290 | 2,847 |
| 1881.... | 17,649,491 | 3,573,034 | 3,333,419 | 58,522 | ..... | ..... | 30,574 | 143,935 | 6,584 |
| 1882.... | 15,161,839 | 2,936,150 | 2,195,127 | 529,169 | ..... | ..... | 32,052 | 169,270 | 10,538 |
| 1883.... | 8,106,447 | 1,705,817 | 1,330,585 | 206,154 | ..... | ..... | 29,446 | 131,341 | 8,291 |
| 1884.... | 8,075,537 | 1,612,481 | 1,395,652 | 46,618 | ..... | ..... | 16,455 | 151,224 | 2,532 |
| 1885.... | 7,330,788 | 1,430,905 | 1,212,768 | 16,795 | ..... | 15,172 | 21,473 | 161,862 | 2,835 |
| 1886.... | 4,668,741 | 832,355 | 652,863 | 17,545 | ..... | ..... | 17,577 | 142,485 | 1,885 |
| 1887.... | 5,485,509 | 979,126 | 757,261 | 17,207 | ..... | ..... | 23,789 | 180,238 | 631 |
| 1888.... | 4,415,381 | 798,673 | 614,214 | 13,468 | ..... | ..... | 5,226 | 164,329 | 1,436 |
| 1889.... | 1,780,765 | 331,958 | 174,027 | 7,879 | ..... | ..... | 22,921 | 124,349 | 2,782 |

CHEESE.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1868.... | 6,141,570 | 620,543 | 548,574 | 68,784 | ..... | ..... | 891 | 1,954 | 340 |
| 1880.... | 40,368,678 | 3,893,366 | 3,772,769 | 114,507 | ..... | ..... | 170 | 5,710 | 210 |
| 1881.... | 49,255,523 | 5,510,443 | 5,471,362 | 28,500 | ..... | ..... | 14 | 10,027 | 540 |
| 1882.... | 50,807,049 | 5,500,868 | 5,471,676 | 18,436 | ..... | ..... | 242 | 8,196 | 2,318 |
| 1883.... | 58,041,387 | 6,451,870 | 6,409,859 | 24,468 | ..... | ..... | 202 | 15,480 | 1,863 |
| 1884.... | 69,755,423 | 7,251,989 | 7,207,425 | 24,866 | ..... | ..... | 188 | 19,248 | 262 |
| 1885.... | 79,655,367 | 8,265,240 | 8,178,953 | 68,978 | ..... | ..... | 205 | 15,899 | 1,207 |
| 1886.... | 78,112,927 | 6,754,626 | 6,729,134 | 15,478 | 80 | 90 | 156 | 9,139 | 549 |
| 1887.... | 73,604,448 | 7,108,978 | 7,065,983 | 30,667 | ..... | ..... | 211 | 11,982 | 165 |
| 1888.... | 84,173,267 | 8,928,242 | 8,834,997 | 83,153 | 5 | ..... | 828 | 9,087 | 172 |
| 1889.... | 88,534,887 | 8,915,684 | 8,871,205 | 31,473 | ..... | ..... | 1,582 | 11,208 | 216 |

"Thus I find that whereas, in the year 1880 the quantity of butter exported "amounted to over 18,000,000 lb. and its value to over $3,000,000, it had decreased "last year to 1,780,765 lb. and the value to $331,958. That is not satisfactory. On "the other hand, happily, there is good as well as bad; the cheese exports which in "1868 were only 6,141,570 lb., valued at $620,543, in 1880 had risen to 40,368,678 lb., "valued at $3,893,366. In the last year the export of cheese has risen to no less an "amount than 88,534,887 lb., valued at $8,915,684. This statement shows the satis- "factory progress in the exportation of cheese on the one hand and a falling off in the "exportation of butter on the other. These are figures which show the dimensions of "trade, and they indicate what important work, both as regards the dairy interest itself "and the future of the Dominion, this convention may very well have before it. I "entirely concur in the remarks of the president as regards the advantage of mixed "farming. In mixed farming you do not, as in grain-growing, depend upon one class "of produce, and further, if dairy practice is intelligently carried out you are really to "a great extent recouping the land for that which you take out of it, and, in fact, in "many cases you may be converting bad land into good land. All these are matters

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"of experiment and of practice. I am glad to see that in various parts of the "Dominion, the Government has thought fit to establish experimental farms. I look "to them as being places where, in the future, much valuable information may be "obtained, and where experiments, which ordinary individuals have neither time nor "the means to carry out, and which, nevertheless, it is very desirable should be carried "out for the public good, can be made by those who have practical and scientific "knowledge combined, and who have no other object, as I thoroughly believe is the "case here in Canada, except the promotion of agricultural science and the advantage "of the Department to which they are attached. I join in the congratulations which "may be offered alike to the dairy interests of the country in the appointment of a "Dairy Commissioner and to the distinguished individual selected to represent the "dairy trade in the Government Department. I am glad also to recognise the services "and personal kindness also which I have received on all occasions from Professor "Saunders, who so worthily presides over the Experimental Farms. As an agricul- "turist, not a politician, I may venture to add one word of congratulation to the Min- "ister of Agriculture, Hon. Mr. Carling, for the results of the work already achieved "by the Experimental Farms, which he has been so instrumental in establishing, and "to join with you in wishing him a long life to continue his labors in this direction. I "have not long ago returned from a journey to the North-West and to the shores of "the Pacific. I have traversed the greater part of the Dominion, although I have not "seen nearly all I should wish to do, but I may say that passing through varieties of "soil and of climate—seeing the immense extent of country only waiting for the hand "of the farmer to come and bless it with an increase, seeing the millions of acres "which are still waiting to be taken up, I cannot doubt that there will be a great "future before the agricultural interests of Canada. It may take many years, even "centuries, before all this present waste land is taken up; but surely, sooner or later, "the time will come when your wide plains, desolate wastes, and vast forests will be "supplanted by a happy, prosperous, contented agricultural community. Then I hope "that those who come after us will look back to efforts of such as yourselves, who in "early days have striven to grapple with the problems which lay before them, and "have endeavored to throw the light of science upon the path of progress. I wish "the Convention every success." (*Cheers.*)

## II.—FIRST VISIT TO ADDRESS CONVENTIONS IN NOVA SCOTIA AND NEW BRUNSWICK.

On March 18th and 19th, the annual convention of the Dairymen's Association of Nova Scotia met at Halifax. I was glad to be able to attend it. An official report of the proceedings, prepared by the Secretary Mr. Paul C. Black, Falmouth, N.S., was published. During the same trip the opportunity was afforded me of addressing meetings at Sackville, N. B., New Glasgow, N. S., Antigonish, N. S., Nappan, N. S. and Fredericton, N. B.

I have thought it to be desirable that the substance of the lectures which were delivered upon different occasions during the year, should be brought to the attention of many farmers whom the voice of one speaker cannot reach; and with that end in view I have inserted under this heading the reports of three addresses which I had the honor to deliver at Fredericton, N. B. By the courtesy of Mr. C. H. Lugrin, Secretary of Agriculture for New Brunswick, I was furnished with verbatim reports of them.

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## FIRST ADDRESS.—DAIRY FARMING.

*Mr. Chairman, Ladies and Gentlemen :—*

It gives me very much pleasure indeed to come down to the Province of New Brunswick to speak to those interested in farming. For a long time in our country and elsewhere, farmers have not understood and have not appreciated the value of their calling as they ought to have done. That state of things has left them isolated and disunited in their efforts for the improvement of their condition; and farmers instead of meeting together often in order to discuss their own business and how best to prosecute it with success, have stood apart and aloof from each other,—have been jealous and have not co-operated,—when they alone of all the classes could co-operate with most advantage to themselves and for the greatest good of the whole community. Before I begin to speak on Dairy Farming, I would like to say a few words by way of explanation as to why I am specially interested in the development of Dairy Farming in your Province.

### DOMINION DAIRYMEN'S ASSOCIATION.

A short time ago a Dairymen's Association for the whole Dominion of Canada was organised, not to do the work properly belonging to Provincial Associations, but where possible to encourage and stimulate farmers in the several Provinces to organise and support Provincial Associations and use them for their own good. A convention of that Dairymen's Association of the Dominion of Canada was held in Ottawa a short time ago, and the delegates from New Brunswick were very urgent in their requests that something should be done soon, to try and stir up the farmers of this Province to pay more attention to Dairy Farming. Very largely in response to that request I agreed to come here. The Minister of Agriculture, Hon. Mr. Carling, was also anxious that I should come to the Lower Provinces and try to show the residents something of the methods that had been successful in Ontario. It is not expected or intended, as I said, that the Dominion Dairymen's Association will attempt to do the work properly belonging to the Provincial Associations.

### NEED FOR PROVINCIAL DAIRYMEN'S ASSOCIATIONS.

But I would commend to you now the desirability, yea the need, of forming a Dairymen's Association for the Province of New Brunswick. Up in Ontario until the Dairymen's Association was organised and took hold of the dairy interest with both hands, intelligently and enthusiastically, it languished, made no progress and brought little profit. But as soon as the Dairymen's Association took hold of it with good judgment and well laid plans, the dairy business commenced to grow and flourish, and is growing more rapidly now than in any past period of its history. Permit me to give you one illustration of the wisdom of the Government in spending small sums judiciously to encourage and foster dairy work. After all that had been done in Ontario to extend the business of making cheese, there was still a very large quantity of inferior cheese made. Our cheese went to England in competition with American cheese made in that great and flourishing Republic to the South. Some years ago the American cheese sold rather higher on the average than the cheese from Canada. The Government commenced to give slightly larger grants to the Dairymen's Associations, enabling them to furnish more information and more instruction, not merely available to every cheese-maker but unavoidable to most cheese-makers; and last year the cheese of Ontario sold in the English markets for $475,000 more than they would have fetched if sold at the average price for the same month's make and at the same date as the cheese in the State of New York, our great competitor. The Provincial Government of Ontario gave grants last year amounting to $6,500 to help to pay Instructors, and as an immediate harvest from that little sowing we got back in cash $475,000 more than we would have got if our cheese had been sold at the American prices. But the $475,000 is not all we get

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back for that investment of $6,500. Our people have been educated in the making of finer cheese, and the fruits of that education will be theirs for all the coming years. Besides, the very fact that our cheese has such a reputation abroad makes our farmers proud of the business, and being proud of it, more of them support it than otherwise would have been engaged in it. Sometimes farmers are wont to think that what they call sentiment belongs to literary people alone,—people who wear very long hair and use a good deal of hair oil. But if you can put right sentiment into a farmer's life and make him feel proud of his business, he will do that business the better for it, and such sentiment to him will prove a paying acquisition. The very sentiment of pride that Ontario farmers feel in having their cheese stand first in the English market helps them to make finer cheese and more of it, and if that is the experience of the people of the Premier Province of the Dominion, I think we can all profit by it. The Government's investment has brought back great returns to that class of people in the community whose prosperity means good times for everybody else.

### WORK OF DAIRY COMMISSIONER.

Then, the Dominion Government recognising more and more the value of Dairy Farming as a branch of Agriculture, and recognising agriculture as the occupation of first importance in our Dominion, established an office called that of the Dairy Commissioner. The business of the occupant of that office is to furnish information, —information applicable to all the several sections of the Dominion,—information of a practical, serviceable kind, so that any man can read the bulletins issued from that office and put their teachings into practice with a certainty of not being misled. But what the farmers of the Dominion need more than information is stimulation. They require somebody to wake them up to the recognition of the importance and dignity of their own occupation, and the value of dairy farming as a means of helping them to follow that occupation with profit.

### VALUE OF CONVENTIONS.

One reason why conventions will be held all over the Dominion is to get into touch with the farmers and bring them into closer touch with each other. If you can gather 500 men into a hall to discuss agriculture, every man will be better satisfied and more enthusiastic over his own business,—and this is not a small thing, because sometimes men find it very hard to become enthusiastic over agriculture. I was down in Antigonish, N.S., last Saturday; the weather was favourable and the people turned out and packed the hall, and some could not get inside. After the lecture, a townsman came to me and said that a good old farmer had come up when the meeting commenced and asked what all the crowd meant,—he had not heard of the meeting. A neighbour told him that it was a meeting to discuss agriculture,—meaning Dairy Farming. "Aha!" said he, "aha!" "Great Scott, I thought it was a meeting called to discuss politics!"—and the sneer to which he gave vent, at so many people coming together to discuss agriculture merely voiced a common feeling among farmers themselves. If we can induce farmers to come together oftener to discuss agriculture, we will not only make them proud of agriculture, but make their occupation more lucrative.

### DOMINION EXPERIMENTAL FARMS.

The office of Dairy Commissioner has been associated with the Dominion Experimental Farms for the purpose of ascertaining the most economical way of raising and feeding cattle upon fertile lands which are to be found in every part of our Dominion. That is why we have Experimental Farms in different parts of Canada—to meet the requirements of the different climates, of which we have a great variety in this wide country. A further intention is to discover, if possible, the foods best adapted for the feeding of cows, sheep and swine in the most economical way, so as to realize the largest profits. Another reason why the Dairy Commissioner's office has been associated with the Experimental Farms is to give, if

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possible, a unity to all their teaching that bears upon animal husbandry in the whole Dominion. Canada is really the home for neat cattle. No other place on all the earth gives cattle such excellent, vigorous health as these animals enjoy in our climate. Then, people who keep cattle with success should also keep sheep, and feed swine and breed horses, that all animal husbandry may be linked into a system for harmonious action; that the one may not compete against the other, but aid the other, and altogether make the *farm* richer in plant food and the *farmer* wealthier in the return he derives.

### IMPORTANCE OF THE FARMER'S CALLING.

Having said so much by way of introduction, I would like to say that farmers fail to recognise the value of their occupation, because they have seldom given any thought to what their occupation means in the world. I have lived with farmers most of my life-time, and I have found very few of them who have any clear conception of what they are trying to do on a farm. A farmer out west was travelling with a friend of mine who was much interested by the man's intelligence. By and bye he said to him: "My dear sir, what do you do when you are at home?" "What is your business?" "Well," said the man, "I ain't got any business; I am only a farmer." There is a too common conception which the farmer summed up in that, "I ain't got any business; I am only a farmer." Now, if a farmer had a true idea of the meaning of his business, he would see that his is the most important of all businesses that occupy the powers and engage the attention of men, in a material sense. The farmers furnish the food of the world, with the exception of fish. You cannot think of anything you eat, if you except the product of the fishermen's toil, that does not come from some farm. You have porridge and milk —porridge and cream they call it in Halifax, but the cream is so blue there that you could see a mosquito six inches down. Halifax cream! I will never forget the liquid. You have perhaps potatoes, ham and eggs, tea and coffee, everything you eat is the product of some farmer's toil, some farmer's skill. Now, if the farmers produce all the food for the world, they are doing a very important work. The better men are fed, the better men live. Farmers have not been the laggards in the progress of civilisation, but if you will scrutinise history with a thoughtful eye, you will find that where farmers have improved the food of the people, the people have become more powerful and influential. The old rich pastures of England produce beefsteak which accounts a good deal for England's influence in the world to-day. The better a man lives at his table, the better he lives at other places and otherwise. Give a man bad food and he gets out of joint with the world and it is hard to preach him such a sermon as will help to make him a good man. Good living in that sense means good living in other senses. Not only do farmers supply the world's food—that is only one half of their work—they furnish the raw material for the clothing of the world. Wool and cotton and leather are first products of the farmer's toil and husbandry, which the manufacturers elaborate into the finished articles for our comfort and service. The farmer himself should be both producer and manufacturer. He cannot afford to manufacture clothing, by not only feeding the sheep, but by washing the wool and spinning it and weaving it; that is not his calling. He cannot afford to do that, but he can afford to produce grasses—corn and oats and barley and pease—and manufacture these into food that the world is willing to pay the highest price for. The man who sells raw material alone gets only one half of the profit belonging to his calling, when he fills his place to the full and both produces and manufactures.

### VIRTUE OF KNOWLEDGE.

To be a good producer and skilful manufacturer, a farmer needs to have knowledge of his own business, and I hope that men who think that knowledge has no place on a farm will soon have no place in the farmer's ranks in our Dominion. Farmers used to require very hard hands to swing the axe all day long, to remove physical obstructions, to construct roads, to build bridges, and to do all that kind of

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manual labour, but the conditions are changed now and horses are made to do the heavy work, and steam the most difficult of the heavy tasks. Man does not need hard hands so much as a clear head. The farmer of the coming time must be a man who will rule his hands through his head, and not toil so hard with his hands as to make his head too tired to do his own thinking. No system and no machinery on a farm can ever take the place of personal thought and good judgment on the part of the farmer. But as I propose to speak on an aspect of that topic to-night I shall not do so now. I will simply say that the scarcest and most valuable commodity on the farms of our Dominion to-day is common sense with good skill. A man has no common sense who sneers at knowledge as applied to his own business. Because a man may have a good deal of knowledge laden on his back or in his head, so that he is both a tired man and a tiresome man, it does not follow that knowledge is of no service to the man who uses it well; and farmers should have particular, accurate and practical knowledge of their own calling. They should have knowledge of how to plough well, so that the frosts will work upon and through the soil all winter. They should have knowledge of the kind of grain to sow, so that sunlight and rain may work their best for the crops. They should know the best cow to keep, so that the cow will not live on them without paying back for what she takes. They should have knowledge of the best goods to send to market, so that they will not have to take a second place or a third-rate price. Knowledge, I say, above all things, is needed by the farmers of our Dominion to-day.

### CHANGED CONDITIONS.

It was not always thus. Manual strength was most in need in past years; but changed conditions have come and we ought to adapt ourselves and our work to those changed conditions. Not only have conditions changed, but they are still changing. They are changing right in these Provinces—changing so that men who live away west of Chicago furnish the hotels of this city with beef-steak, instead of it being furnished by the men who live on the fertile soil around about us. Men will say: "O! we cannot compete with the cheap beef of the West." Well, why is it? Because we have not enough knowledge and we don't put the knowledge we have into practice to aid us in our work. Where does the cheap beef come from? Well, I have been West a good deal trying to talk to the farmers, and I have gone upon the farms there and found men feeding steers on land that was worth $100 an acre, upon fodder corn from the silo at a cost of 2½ cents per head a day—the cattle gaining from a pound to a pound and a half a day. They could sell them in Chicago at a profit at 3 cents a pound. The beef that comes here, comes not from the cheap lands of the West alone, but from land worth as much as ours, and after paying freights and charges of the middle men, it is driving us out of the market, because we have not been using the same skill and knowledge. I see no reason why we cannot produce good beef here at a profit, as cheap as it can be produced anywhere in the world, and if we do that we will occupy our own markets and give occupation to our own people.

### LOCAL MARKETS.

Suffer a few words as to your markets here and their requirements. You have in these Lower Provinces, an unsupplied butter market. True, there is plenty of butter here worth 10 cents a pound, and very dear at that, because, unlike some other things, people do not pay up for butter according to its strength. But there is a very large demand here for butter of a mild flavor at 25 cents a pound; and that demand is not met and never will be met until better butter is made. Then, you have a market for cheese here. There is no reason why you could not send cheese to England (after supplying your own wants) and get back English gold just as Ontario is doing now. Then there is the market for pork and bacon. I find that a large quantity of pork and bacon is imported here from the Western States. Well, the hog is not such an undesirable citizen, if he is well fed and well kept. He is the one great citizen of the



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American Republic that has helped most to make it wealthy. Of course, I mean the kind of hog that is fed in pens.

### BRITISH MARKETS.

Then, there is a large home market for fresh beef. Now, after you have filled the home markets with these products you have still the best market in all the world for food products—the market of the British Islands. It is not so very far off. People sometimes say it is too far away. Well, how far is it away from us here in New Brunswick? For butter, it is distant not more than one cent a pound. I have been at places in Cheshire in England, that were just as far from the London market as I was away back in Guelph, Ontario. You see in commerce, men do not need to count miles, but they have to count costs. We are less than one cent a pound on butter and cheese distant from the English markets, and the English people themselves are very often quite as far as that from their own markets. I would ship butter to the man in the moon if I could land it there at a profit, and safe transportation were possible at one cent a pound.

The English markets will take all the food products we can send them for a long time to come. You need never fear that you will glut these markets, if you have fine products to send. Canada sends to England 90,000,000 lb. of cheese, and England buys abroad 213,000,000 lb. per year. So we send her over 42 per cent. of the cheese she buys abroad. We send to England 2,000,000 lb. of butter per year and she buys abroad 216,000,000 lb. So we send her less than 1½ lb. in every hundred pounds of butter she buys abroad. We could send her more, and we will send her more, when we put more knowledge and skill into the prosecution of our own business. We send to England 100,000 cattle yearly and she buys abroad 500,000; we send her 20 per cent. only of her imported cattle. The advantage of being permitted to send our cattle inland through the British Isles without their being slaughtered on landing, is a privilege worth at least one half cent a pound to us. With that premium on our cattle—due to their general healthy condition which I referred to before—why could not we send a larger share abroad? It is either that something is the matter with Providence, with the country, or with ourselves. I am just modest enough to think the fault is with ourselves rather than in Providence or our country. Then, we send to England, of pork and bacon, 8,530,000 lb., and she buys abroad 545,000,000 lb. We ought to continue to send at least one third of the cheese that England buys abroad, besides a much larger share of the products I have mentioned which would yield us good profits, leave the soil rich and give our people the most profitable occupation. Now, Dairy Farming will help us to do that.

It should be our aim to follow these three lines of farming effort—the producing of food, the maintaining of the fertility of the soil, and the providing of remunerative employment for our people. Any system of agriculture that will do that, is a kind of agriculture that will pay the people, who follow it with energy and skill.

### PROFIT AND PRICE.

I would like also to lay down this proposition and make it clear, namely, that men who farm for *profit* should concern themselves far more with getting *profit* by reducing *cost*, than by trying to raise the market *price*. There is only one way in all the world whereby a man can raise for himself, with certainty and equity, the market price of anything he sells, and that is by improving its quality. The quality governs to every man the price he may obtain. I will give you an illustration. In all the large cities of our Dominion, butter ranges in price from 10 to 25 cents a pound. Now, no single farmer and no combination of farmers can force the butter market up or down. If it is forced up too much, then the butter that would otherwise go abroad is kept at home; if it is forced down, the butter is sent abroad. Thus we cannot influence the market price. But any man can raise himself from being a 10 cent-a-pound man to being a 25 cent-a-pound man, by sending to the market just the butter for which the people will pay 25 cents. A man can change his place on

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the scale any time, by improving the quality of his product to that of superior excellence. Men are always looking for profit at the market end, instead of the home end of their business; and being mistaken in the direction of their effort, they have small success. Profit lies in any business between the price that is realized and the cost of production. If we can reduce the cost of production we lengthen our line of profit certainly at one end, in lessening the cost; and if the market goes up we have two profits,—one made by our skill and the other by the rise in the market. If the market goes down we still have our profit at the safe end of our endeavour by having reduced the cost of production. So the man who can reduce the cost of production, is the man who is farming with most profit, because reduction in the *cost* of production does not reduce the *price* he may realize. Another illustration:—Suppose that two men are living on neighboring farms, and one man produces his butter at 25 cents a pound. He feeds hay and meal to rather poorly bred and badly kept cows, and his butter costs him 25 cents a pound. The other man keeps cows that are better adapted for butter making, feeds them on the cheapest kind of suitable feed, including corn ensilage, and produces butter equally fine at a cost of 15 cents a pound. They both sell in the same market. Does this man who produces his butter at a cost of 15 cents, have to take a price less than the man who produces at 25 cents? I trow not. He gets at least an *equal price* but a *larger profit*. He has *a profit* whereas his neighbor may have none. So our endeavour should be more along the line of reducing the cost of production than raising the price to be realized, except in this, that the price can be modified by an improvement in the quality. The farmer will work out his own economic salvation far more surely, if he will give his attention to that, than if he pays heed only to the market.

### FOODS FROM FARMS.

The farmer's sphere of occupation is concerned with the production of food and the obtaining of service from all the resources of nature. The world to-day wants food in the form of animal products; and the farmer who would farm skilfully and successfully must keep stock, that through them he may provide the kinds of food that the people want and are willing to pay a high price for. The man who would farm to the full extent of his farm, and with a view to the greatest profit, should grow plants suitable for the needs of the animals that he keeps; and herein is offered a sphere for the exercise of the best skill. It is the highest exercise of sound judgment, for a man always to grow in his fields, plants adapted to the needs of the animals he keeps, that from the plants direct, and through the animals he may obtain complete food and all the food the people want. A man who keeps animals can always increase the food supply per acre of his farm. When a man grows a crop of wheat, not more than one-half the total life-sustaining value of that crop resides in the flour; the other half of the total life-sustaining value of that crop is held in the straw, chaff and bran. True a man cannot live on these things, but a man who provides flour for the world's use, and feeds these things to his cow,—(not as the cow's sole food, since they can be supplemented so as to make them profitable,)—may get from his crop both bread and butter. In that way, a man who keeps animals may always increase the food supply per acre from his farm.

### SUITABLE CROPS.

A man should always see that the plants which grow on his farm are the ones best adapted for the attainment of the object he seeks. A man who would grow hay only for cattle fodder, forgetful that hay is not by any means the plant or crop through which he can get the largest service by keeping animals, would soon go to the wall. You would not think a man was wise, who made his business that of a swine feeder and who grew nothing but hay as the crop on which he meant to fatten them. He would not be adapting the raw material of his farm to the business of manufacturing animal products. We sometimes think that because a cow will eat almost any kind of plant, therefore everything is adapted to the cow. That is not



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the fact. By feeding expensive food, we increase the cost of production; thereby the cow consumes more value than she produces and thus becomes unprofitable. It does not pay to feed a cow on strawberries. I tried that one time myself. While I was talking to a young lady one evening, a cow ate two baskets of strawberries out of my buggy, and yet she did not give any more milk or produce better butter. Some men are all the while feeding their cows on plants too costly for the value of the products of the animals that eat them.

### SEED TESTING.

Emphatically, in dairy farming, are skill and judgment needed to provide seed of the best variety. There are in this country now known over 75 varieties of corn. They have not all equal feeding properties—equal powers of service—and many experiments have been conducted of late years to discover the variety of seed which will render the largest service through its plant growth. This is also one of the uses of Experimental Stations:—To discover for the benefit of the farmers the varieties of seeds of all kinds which can render them the most service in the growth of the plant. That is also the value of having seed-testing stations, because in these Lower Provinces a very unfortunate state of things exists with regard to the growth of cereals. In some of the tests that have been made, the grains have not shown more than 47 to 48 per cent. of vitality; and that may be why you sow down here 4 bushels of oats to the acre instead of 2 or 2½ as they sow elsewhere. Every farmer ought to test the vitality of his seed grain before it is sown or planted. We will try and look into it at the Farm at Nappan, and see if it would not pay the farmers better to import their seed for a short time until they re-invigorate its quality and thus get back seed-grain of all sorts which will give them at least 95 per cent. of plants from the number of seeds sown.

### VALUE OF MANURE.

Then, after the seed is sown or planted, the farmer's business should be to provide plant food in abundance and of suitable sort for the sustenance of the plant, that it may grow in size and accumulate nutrition within itself for feeding animals and sustaining human life. It is a question of food all the way down,—food for animals and food for plants; and the man who fails to feed his plants through his soil, will by and by fail to find food for himself through his farm-work. Very many farmers have been so neglectful of providing food for their soil, that their soil has become poor and they must of necessity partake of a like quality; because when a man impoverishes his farm, if he stays on it he must in time grow poor himself. That is an unavoidable, inexorable law in agriculture.

Now, the soil of the farm in agriculture is mainly to be considered as a storehouse of plant food, and a feeding place of plants while they absorb that food into themselves. Water is in the nature of a vehicle for the conveyance of plant or animal food to its proper place inside the plant or animal. A man begins to understand that water is a vehicle for the conveyance of things in nature,—nature's wonderful omnibus, in which she puts things big and little to have them moved about easily,—when he sees what it does in the case of large streams and great rivers which bear on their bosoms the commerce of the nations. But that is a far-fetched illustration as far as the use of water in plant-growth is concerned. Here is a better one. I knock a piece of skin off my hand. I do not go to a doctor or shoemaker to have a piece stitched on. I merely go on eating as usual and the water in my blood keeps on circulating and depositing in that place, just the right kind of material, until the skin is replaced in its former state. Water is like the hod-man that carries around the material for the skilled workman to put in place; and my life is the master builder that in this case builds on the skin.

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### USE OF DRAINAGE.

Then, you would say if water be so valuable and necessary a commodity, the more water you have for plants the better. Well, if any man in seeking to carry out that hastily formed conclusion, should plunge me into water and leave me for several minutes in water that was over my head, what would be the result? The result would be a drowned man. As soon as the water stays around the whole of my body, the water inside my body stops running; and the skin that is knocked off stays off, though I may have lots of food in my stomach. When the roots of the plant are surrounded by water, the water inside the system of the plant stops circulating; there may be abundance of food around its roots, but it cannot live on that because there is too much water there. That indicates one of the many values of drainage,—it removes all surplus water and leaves just enough for use in the circulation of the plant. Too little water is as bad as too much water. If I have my food all dry—made entirely free from water,—why I cannot chew it; it refuses to be swallowed. I must have a vehicle to carry it down my throat easily. If I do not drink any water, I cannot sustain my life. That is why plants cannot grow in dry soil and weather, because there is no omnibus to carry the food up into their system. Good drainage provides for the plants an abundant supply of water—enough and no more. So I would recommend that in all cases where it can be done and has not been done by nature, you should have the soil drained to have all the surplus water removed, and yet to have a sufficient supply brought there and left there, from the atmosphere and the great reservoir down below.

### THE AIR AND SUN.

The air is the other store-house of plant food. Between 92 and 98 per cent. of all the substances of plants comes from the air. The man who farms well, will have his plants grow a suitable distance apart, as far as practicable, in order that the air may circulate freely and the sun shine in brightly, that the plants may get from the air the food it contains for them. This is one reason why it does not pay a man to grow a crop of broadcast corn; the stalks are so close together that there is not enough circulation, the plants have less vigor and the soil becomes exhausted. * * *

The spring in my watch is merely what the plant food is in the soil. The spring is a contrivance into which I store my own strength; the plant food is a convenience into which the sun can store his strength, his energy. And then, when a horse eats a bundle of hay, he is merely transferring into horse-power, the power which the sun rolled into that pecular plant-spring. In that way the sun is doing all the work of the world. A long time ago the sun was shining down on the earth, hotly, vigorously and continuously. He was rolling himself up, year by year and century by century into plants—plants that stored his strength with avidity. Then there came great changes in Nature and those big trees and plants, full of the sun's energy, were buried away down deep in the bowels of the earth; but still they held the sun's strength. Men open mines, they dig up concrete sunshine and energy, in the form of coal; the furnace is filled; the magic liberator—fire—is applied; and as the mighty engine moves, wheels are turned to-day with the energy which the sun wound up in the vegetable kingdom of the earth ages and ages ago.

The man who furnishes in the soil no plant-food for the young plant, keeps the sun idling on his field all the day long. So a man ought to make it his pleasure, as it is his privilege to harness the old sun every day in his farm work, and make it do his will by making it roll its strength into such plants as he wants for his service. Now, a man could never afford to hire half a dozen men on a farm and have them "loaf" all day long, while he is wearing himself out with working. But the man who wears himself out with working and keeps the sun idling all day long, is doing a far more foolish thing. So a man should recognize that he has the right—that he has the power—to control the sun's working, make it work upon his fields, and thus save himself from the reproach of leaving the best working

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power in the world idling on his place. The farmer requires skill, he needs knowledge, he must have above all things good judgment in order that he may fitly control and exercise the power placed at his command.

Let me show you what all this means, practically in Dairy Farming. The man who farms successfully and skilfully in Dairy Farming will always have abundance of plant food in his soil, and therefore he will keep the sun working for him by giving the sun the raw material out of which to build plants. If the sun be deprived of that he does not intend—using the word figuratively—to work; he will not make bricks for any man without clay. There are men who are all the while running counter to these old foundation laws that were made for agriculturists. One man thinks that it makes no difference how much sunshine he has or how little. It makes all the difference in the world, and that is why in Canada we have the best chance in all the world for making farming pay, because we have more sunshine than they have anywhere with an equally favourable climate in other respects.

### ELEMENTS OF PLANT FOOD.

Three of the elements are becoming scarce in the soil of this Dominion. These three things, which plants need most are nitrogen, phosphoric acid and potash. These are becoming scarce. Farmers sometimes think because these words are uncommon, therefore they have nothing to do with the substances. A farmer's calling consists in providing food for himself, for his family and for mankind, then food for animals, then food for plants. Plants cannot live unless they have these three substances in their food; this lies at the very basis of the farmer's work, and he should know the meaning of these terms, and of what main ingredients the food of plants consists. He need not be able to analyze the food, or to spell the words; but he should know the meaning of the things themselves, and if he does not know he ought to know. I have no apologies to offer a farmer when I tell him that he ought to know what nitrogen, phosphoric acid and potash mean. Plants cannot live without these substances, and therefore farmers should know about them.

If a man sells the whole crop from his field, he sends away all these things which the plants take out of the soil. He sends these substances that are of value to him, off to somebody else. If instead of doing that, he will feed the plant to the cow, he may sell the milk the cow produces in place of the plant. In selling the milk he will send away less than 20 per cent. of these valuable constituents which the plants contained, and have 80 per cent. to go back again into the soil. That is why it pays to sell animals and their products, rather than the crop raised in the field.

The *nitrogenous* portion of the grain or plant, goes to make the muscles of a steer which is being fattened. The *phosphoric acid* goes to the building up of the bones and nerve tissues. The *potash* stimulates the green colouring matter which secretes the starch, sugar and gum in the growing plant. You see, therefore, that these substances are concerned in the formation of muscle, bone, nerve and heat producing substances. Every plant needs these things. The animal needs these things. The animal keeps some of these from the plants; and the remainder goes back into manure for the use of the plants again. Thus we have a rotation, not of crops, but of fertility which keeps the man's soil always rich while enriching himself; but the man who sells his crop all off, prevents the rotation of fertility, keeps the old sun half idle and thus loses his profit.

### BARNYARD MANURE.

A word or two as to the composition of barnyard manure. Farmers do not pay half enough attention to it. It is a topic that is generally ignored in farm literature. I mean with regard to the practical details of its management. There are people who are so eminently fastidious in the use of language that they try to, or succeed without effort in making ideas misty instead of making them clear; and because some people forsooth have thought that to discuss barnyard manure would not be quite

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polite, therefore it has been left almost in the background, and farmers have suffered in consequence. There is nothing vulgar in all the world,—nothing truly vulgar, —except stupid ignorance; and that always is. So I have no apology to offer for mentioning barnyard manure. You see it is a peculiar power that nature possesses, to take the most vile substances, refine, reglorify and build them into plants and food for mankind. And the man who would do his work well, must complete his knowledge on this phase of it, as well as the rest of his operations. These are the average compositions of barnyard manure as obtained from these animals, and in every ton of manure there are just as many pounds as these lines are in length—half an inch to the pound. Now, I have not the time to go all the way down that list with you, and a few words must suffice. On an average in every ton of whole horse and cattle manure there are between 29 and 19 pounds in all of these three substances. If a man by careless treatment or neglect loses these 19 or 29 pounds, the rest of the substance is of no value for feeding plants. What remains may weigh as much as manure ought to weigh, and look exactly as ordinary manure would look, but it is of no use to the farmer. Therefore for lack of knowledge farmers frequently let the valuable portions of their farm-yard manure trickle off down to the sea, getting no returns for it whatever, whereas if they would save these substances, the old sun would multiply their value a thousand-fold.

A man who sells $1,000 worth of butter, sells less than $1 worth of these substances. So that a man who farms skilfully and intelligently can be a manufacturer, giving his raw material the greatest increase of value possible to obtain. Much the larger part of the total nitrogen in the voidings of animals is contained in the urine. The man who keeps his stable clean by the convenient process of boring a hole in the floor behind each horse or cow, is losing more than two-thirds of the value of his manure. That liquid should be all absorbed by litter and put in the manure. Escaping steam from the manure carries off the nitrogen, and the only way to prevent that loss, is to have the whole of the manure well mixed together and gypsum sprinkled over it.' Gypsum will fix the escaping ammonia and thus save the loss of nitrogen. Great waste too, arises from the leaching of manure. If the manure be heaped under the eaves, rains will trickle through it and carry off the potash without which plants do not grow. If a farmer wanted to make soft soap, he would not be a wise man if he wheeled the ash barrel into the angle of two buildings where the ashes, as he put them in, would be rained upon by all the rain that ran from the roofs, because he was not ready yet to make his soap. The rains running down through the ashes would carry off the lye, and when he got ready to make his soap he would be very badly left, because the lye had left some time before. So the man who treats his manure-pile in that way, will fail to realize his expectations. It will not be strange if you hear him saying, as many farmers do say, that manure does not seem to make the land any richer. Leached ashes will not make soap and leached manure will not make plants grow vigorously.

### FODDER CORN.

Then a man should drain and cultivate his soil in such a way as to make its constituents most available for the crops he is raising. His judgment too, should select the variety of seed that would give him the best service. Just here I will refer shortly to fodder corn and the silo. Fodder corn is the most serviceable of any of the plants grown in our Dominion. Men who imagine that fodder corn can never be grown to advantage on their land, have never tried to grow the right variety. On the average in our Dominion farmers can grow 16 tons to the acre of fodder corn,—in many sections far more than that; but that would be the average over the whole Dominion. At Nappan, N.S., last year, corn was grown to a height of 14 feet; at Guelph last year we had no corn higher than 12 feet, and we had there on one piece over 22 tons to the acre, actual green weight. All through the Province of Ontario I had reports from farmers who got from 22 to 27 tons to the acre, with stalks not as tall and no more vigorous in growth than what I saw at Nappan yesterday. It can be grown in this Province to great advantage, if you select the right

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variety. Fodder corn is essentially a plant needing plenty of sunlight and free circulation of air. It is also a plant that grows deep in the soil, and hence is a valuable plant to employ in the rotation of crops. The roots go deep and the plants obtain support where the roots of many other plants cannot go. Therefore fodder corn does not exhaust the soil if planted in successive crops as much as turnips, or oats or even barley do, because its roots go very deep and loosen the soil. The roots at first sight seem to be quite short, but if you should take the trouble of washing the soil from the roots you would find them extending from 14 to 22 inches, mostly in an oblique direction. A leaf forms at each joint and only one leaf. In most illustrations that I have seen, two leaves are shown, one on both sides of the joint. I have never seen any growing in that way. Because there has been a good deal of book-teaching of an erroneous character, farmers have been disposed to despise all information given in books. When I went to prepare my diagrams I could not find a single diagram in all the collections I had, that had not two leaves at each joint, though I had never seen a corn stalk growing that way. The agricultural press of to-day, however, is not filled with statements that have been guessed at. There was a period in our history when that was the case, but now-a-days Experimental Stations have been established everywhere, by which exact information is given to the agricultural press, which is now a great power for the elevation of the farmer's mind and position. I have heard of men attempting to do all sorts of things depending on the teaching of books, and they don't always succeed. Those who relieve the dull routine of their own existence by writing all kinds of questions for the editors of these papers to answer, will not always find their answers to be gospel. Mark Twain was the editor of one of these papers, it seems, at one time, and when asked what was the best way of harvesting the turnip crop, replied "Send a small boy up the tree to shake them down." It does not always pay to follow a book, even when the general teaching of the book is good. Common sense is a good complement to mix into all advice received, before it is acted upon.

### COWS AS BOARDERS.

So when a man becomes an economical producer of feed, he should also become an expert and skilful profit-making manufacturer of saleable products from his own raw material. A man who keeps cows, or steers or swine, or sheep is merely thereby seeking to concentrate and give increased value to the raw material which he has obtained from his farming operations. The animal therefore is to the farmer what the machine is to the manufacturer,—an appliance or convenience for elaborating and making more valuable the raw material he has produced or obtained.

But without arguing further along that line, let me take up another style of discussion. A cow eats the food that is provided by the man who owns or keeps her. Therefore the cow boards on somebody. Now, I cannot board ten men at my table for the sake of their company. I am not fond enough of company for that. Well, if I boarded ten men for the sake of the pay, and five men paid for their board and five did not, I would soon find that out and let the five men, who did not pay, find another boarding-house. I do not see any difference in the economical aspect of the question, if you substitute cows for men. If ten cows board in my stable they board on me and I look for pay for their board. I am not likely to keep them for their society or simply for their company. If I find that five of those cows are not paying their board, I am not likely to keep them for their society or because I am fond of looking at them. Neither do I think, though many would do so, that it would be quite fair for me to palm them off upon my neighbour. That would not be good farming or good citizenship. An unprofitable cow should be sent to the butcher and made to give up through her carcass what she won't give through her milk-bag. You will need to understand the kind of cow that is likely to pay for her board. Here are five points that may serve a man to judge a good cow, because all good cows have power to make profits, and power in any department of the physical world is usually indicated by certain external evidences. A real good

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dairy cow should have a long udder lengthwise of her body ; and it should be very elastic in quality. The elastic quality means room to make milk. She should have a soft skin,—a mellow skin covered with mossy, silky hair. That a cow has only one skin is self-evident, and still most people hardly ever think of it;—one skin around her body and clear through by way of her stomach. The skin, if coarse or harsh, means sluggish digestion inside, and that means an expensive cow that does not digest her food or thrive well. Then, a cow should have a large roomy barrel for holding plenty of good, rough, bulky, cheap feed ; it should be filled up twice a day. It will pay a man who has never done so, to try the experiment of feeding his cow twice a day. Those who have done so, have never gone back to any other practice. Then, again, while a large barrel is an indication of profit-making power, it will pay a man to see that the milk veins under the cow's belly are prominent. Prominence is a far more important indication than actual size would be. Firm muscles mean good constitution. They are one of the best evidences of endurance and thrift that you can find in a cow; and endurance to stand the strain of giving milk continuously is what you want. A cow should have broad loins with long rumps. She should have a rather long, lean neck, with clean cut face and prominent eyes. These points indicate enduring power to stand the strain of a long milking season. If a cow has these five points she will usually have the power of serving a man well, namely:—Long udder, broad and elastic; a soft mellow skin covered with mossy silky hair; a large barrel with broad ribs wide apart and very firm muscles in the abdomen; broad loins with long rumps and lean hips ; long neck, clean cut face and large eyes.

She should be given a chance of paying for her board. She should be kept where she is comfortable. Comfort is the essence and sum total of all stabling of cattle whether the stable be of stone, brick or wood. All are equally good if the cow is equally comfortable. If a man keeps his cow uncomfortable, he has so far deprived her of the power of making profit. The cow should be curried every day. My thoughts go back to the old homestead where we had forty cows, which were curried once a day. A cow gives more milk when she is comfortable. She should be made to pay for her board just as she eats it ; that is the best way. A man is not a good manager who lets his cow live on him for six months in the year without paying, and then expects her to pay for the whole year's board in the other six months. He can hardly expect that the cow will pay for her winter's board in the summer.

### MILKING DURING WINTER.

It is folly to keep your cow for six months without getting any pay, and then come down on her in the spring and say "you have got to pay for your board or get out." I would have the cow make me a weekly offering, as the churches commend. Most of the churches have good business tact and are managed by men of good sense, and if they had more of it they would be appreciated more than they are. A man will give a dollar a week to his church when nothing would induce him to give $50 at one time. Make the cow give a weekly offering. A cow will give more milk, if her milking season commences in October than if it begins between March and May. If a cow calves in March or April, when the cold weather comes in the Fall she dries up anyway, and therefore boards on the man during the winter too long without paying for her keep. Butter is dearer in the autumn and winter ; skim milk is worth more; and if our cows generally calved in the Fall we would be able to largely develop our export trade in dairy products. Butter made in the winter time is worth more and keeps longer; and calves grown at that time are more vigorous and can be attended to more conveniently, as they come at a time when the farmer has leisure to devote himself to stock-raising practices.

### WATER AND SALT.

Then the cow needs to have access to all the water she can drink. We sometimes see milk that has too much water in it, but it is not put there by the cow.

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If a cow has abundance of good food, the more water she drinks the more and better milk she will give. Cows need salt every day, not so much here by the sea as they do further inland, but still they need some. I made a test at one time, and I found by changing the salt back and forwards among the herd, that the cows gave 14½ per cent. less milk on the average, for two weeks when they got no salt than when they had it; and furthermore that milk obtained from cows which had no salt would not keep as long by 24 hours. It does not pay to throw your cow a little salt once a week. There are people who act thus but they are not Scotchmen. They are never quite sure that their observance of the Sabbath has been quite complete until they have placed a little tin pail on their arm and started for the pasture. Giving salt to cows regularly means more milk and better milk; and the kindly handling of cows at all times means increase of milk. If the cow is abused or excited or rendered uncomfortable in any way, she gives less milk. A cow fed on cheap food in a comfortable stable at regular hours, with access to all the water she can drink and an allowance of salt every day, can and will pay her board if she is well bred. Good breeding does not mean long pedigree. It means good behaviour both in cows and men. The man who keeps his cows boarding on him becomes a servant to his cows, instead of them being his servants. The man who would be a successful farmer is a man born to rule, to rule nature, to rule plant-life and make it subject to his needs, to rule animal life and make it develop and continue for his service and pleasure. Such a man will not be a mere beast of burden, but will employ the skill of his head and hand to the advancement of his material welfare and of the noble profession to which he belongs. Knowledge applied to work, with skill and enthusiasm, is what is required, and then the farm will pay and give the farmer pleasure as well as profit.

## SECOND LECTURE—CO-OPERATION AND THE SWINE INDUSTRY.

DELIVERED BEFORE THE MEMBERS OF THE NEW BRUNSWICK LEGISLATURE AND OTHERS.

*Mr. Chairman, Ladies and Gentlemen :—*

I am very glad to have an opportunity of speaking to-night to such a distinguished audience, and I have to thank the members of Parliament here for the compliment they have paid the farmers of New Brunswick in giving their time to listen to a few remarks concerning a subject of much importance to them. When the legislators throughout all these provinces of the country think it not beneath their notice to discuss the farmers' calling, then every man may take more heart and courage to prosecute that calling with new vigor and success.

I think, sometimes, that if the *leading* men of the country would pay more attention to the agriculturist's tasks, his place in society and his economic progress, there would be more real leaders among them.

When a farmer sees men, with larger opportunities for forming sound judgments, ignoring his claims, forgetting his calling and concerning themselves wholly about other things, he is tempted to look upon his calling as being one of manual toil only; and often seeks to leave the farm, when, were his calling looked upon as it should be, an impetus would be given to it, and the country would profit thereby. Your province has set a first example to the other provinces, by your legislators giving their presence this evening at the expense of other public duties,—advertising by that presence here to-night the interest they feel in the welfare of that honorable class of men who follow farming for a living.

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The farmer follows no mean calling; his is no mean occupation. It does not demand toilsome effort and strength alone; but it requires now-a-days first of all good judgment and clear headed application of intellect to the requirements of his business. So on this chart I put "man," typical of his race, above his food; and I think that is where he ought to be always and everywhere. The farmer's occupation is to find

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food for himself and his race, and to obtain it from all the resources of nature which the Creator gave to him, that he might exercise dominion over them. The man who farms, and farms well, rules; but that requires the most careful judgment, and the highest intellectual qualities. When he has learned to govern animal life and plant life, then he has ruled to some purpose; and then that farmer may rise to rule higher forms of activity. Thus by and by we shall hear of farmers ruling the world. After they have learned to rule the lower phases of life correctly, they may rise to rule others with advantage. In doing his work the farmer must raise animals, as the world requires numerous and varied products for food. England and this continent consume more food per head of their population than they did 25 years ago. We eat more beefsteak per head, we eat more mutton per head and more bacon than the people of 25 years ago. Vegetable products are replaced by animal products; consequently the farmer must keep animals adapted for the yielding of food, and he must necessarily keep them at a profit. A farmer, who takes more out of his land than he gives back, is not farming; and a cow that eats more than it gives back to him is a burden on him, instead of being his helper. The man who keeps a good cow, keeps a friend; and a poor man can best afford to keep the most cows, if he keeps them on good food. When he learns the business of raising good cows, then he will succeed. The world's market is never glutted with superior food; there is often a glut of inferior things in every market and every climate, but there is seldom a glut of superior food; and people are willing to pay for it at high prices, when they get a chance of buying it.

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The only three elements which give manure any value as plant food, are nitrogen, phosphoric acid and potash, and these are the only three to which I have attached any value on this chart. If a man lets these run off, how can he afford to buy fertilisers? Let me give an illustration to make my meaning plain. A man says: "I must have some food for my boys, hungry boys at home." In the carrying out of his judgment he starts to some baker's shop, meanwhile carrying on his back a bag of flour, with a hole in the bottom of the sack. On his way there, he loses sufficient flour to make the loaves. He starts home after having purchased the bread, and upon his arrival congratulates himself in saying, "I have done a fine thing; I have brought bread for my boys." And so he has, but he has lost twice as much flour as would make bread for his boys. So it is a good thing to buy bread, but not to trickle flour on the sidewalk while going to make the purchase. When farmers buy commercial fertilisers without first caring for their barnyard manure, they are in the same state, as the man who went to the baker's shop to buy bread while carrying flour on his back. When farmers allow or cause the nitrogen, phosphoric acid and potash to escape, they lose the only three things that give the barnyard manure its value as a fertilizer.

The soil is mainly a store house for plant food. During the past ages when the Lord was making the earth, He used great powers to grind the rocks up fine; and He did it so well that He pronounced it very good. The farmer ought to know enough to keep up the same practice,—to operate by the same process that nature used. If you examine the soil you will find it to be composed of particles separated by spaces, the particles being full of pores. Every plant needs light, heat, air and water. If a man in the course of handling the soil lets the tiny parts be immersed in water, it loses some part of its nutritive power; and if a man removes all the water he cannot get a thrifty plant to grow. A man who would farm well should have drains under the soil, so that the water may leave behind in the soil, the nitrogen which would otherwise run off on the surface; he should also let the frosts work for him; he should plough in the Fall, that later on, the frost might crumble some portion of the soil and so make it finer.

To illustrate: When one walks at the base of a steep cliff in the spring and sees pieces of rock strewn on the path below, he may reason back to the cause that brought those pieces there. He will find that the water found its way into the little crevices and that the frost came, and wedge-like burst off a portion by its own action

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on the water. If you examine the surface of a small piece that fell off, you will find that it has been acted on in the same manner; of course, the surface is smaller and the process is slow, but little fine pieces are broken off, and this same process is carried on and on. These small particles are left in the soil, so that alternate freezings and thawings pulverize it and make it more easily available for plant food. A man is not warranted in forcing down the fine tilth, eight inches deep the next spring; but he is a wise farmer who follows surface cultivation in the spring. The roots of some plants go down deep, and in going down deep they die, decay and make more plant food. I have seen on a tombstone in a churchyard tiny little plants growing. They are at first almost invisible to the eye. They die and become plant food for other plants. After successive generations of plants, the stone is hidden from view. These changes are going on continually. When one plant dies, it furnishes food for others. The further the decayed roots lie below the surface, the further the succeeding crops send their roots. Care will naturally quicken the activities of plants. It is only when a man takes advantage of all the facilities which nature provides for him that he farms with success. Every man should do that for this reason, that if a man does not adopt some means of increasing the feeding scope of his plant in the soil, he so reduces the plant food area, that he leaves the soil on his farm poorer and shallower than when he found it; and every man should farm so as to leave his soil deeper and richer for his successors than when he took hold of it. That is good farming; every other man robs the soil and no man has the right to do that, after it is cleared.

Water is a circulating medium—nature's omnibus for moving things around. I will not speak as to its action, but will give you an illustration as to the possibilities of co-operation. Water, so useful in nature, is composed of molecules so small that they are not visible to the unaided eye. I sit down and I watch a little boy blowing soap bubbles,—you will think it foolish both for the boy and me. I watch the soap bubbles burst; I cannot see the water, but from one of them I try to get a conception of the molecules that compose the water of its film. I got just a glimpse of a conception of the size of those molecules, so important and so useful in the world. By using an illustration—I think from Prof. Tyndal—if you were to have that soap bubble magnified till it became as big as a waggon wheel, you would imagine that you could see the molecules upon its surface. That, however, is not his proposition but a stepping stone of mine to it. If you had that bubble enlarged till it was so big that it would make a jacket for the whole earth, you might see the molecules like No. 6 shot, that is, after that soap bubble was magnified to that tremendous tenuity. You may see from this what these infinitesimally minute things can do when they all act together. Put a quart of water in a strong vessel constructed from the best material of iron or steel, into which man has put the skill and experience of centuries, and all the ingenuity of workmanship that can give it toughness and strength. Have it 6 inches thick; let its hollow chamber be filled full of water all composed of those little molecules. Let it be closed securely and then let it freeze. What happens? Those tiny things all push for the one object. They seem to stand sideways and shoulder to shoulder, and as these little things push they burst the strong vessel as if it were an egg shell. This iron vessel gives me an illustration of coercive combinations, and the action of the water gives me a conception of what farmers can do when they learn to co-operate for industrial improvements.

I will not speak to you of the air and the sun, or how the sun assists in the formation of plant structure and food, or how its wonderful strength is stored up to be used 'at man's discretion. If a man will do the chores, the sun will get in its work. That good old man, the Hon. Harris Lewis, who used to come from New York to Ontario to give us some talks on dairying and agriculture, in the course of the talk one night, said some things that struck very hard against the prejudices of some present. He was a man who spoke without trying to raise them, but who went to the root of what he was talking about,—that is the best kind of a speech to have. After he got through, one of the bumptious fellows in the assembly said: "Mr. Lewis, when you are at home you don't farm, you make vinegar don't you?" The old man arose with one of the kindliest expressions to answer this rough fellow.

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"Oh no," he said, "I never make vinegar. There is a vinegar factory on my farm, and when I do the chores the Lord makes the vinegar." It is no mean job to do the chores, it does not belittle us any. You can see the need for co-operation and education, so that man can do that work well and with the largest service to the world, while leaving to himself the most leisure that he might be the better man.

There is a difference between co-operation and the commercial combinations of to-day. No man need say that one who desires farmers to co-operate is urging them to combine. The combine has always in it an element of commercial coercion. Co-operation is to help men to act together, to *give more* to the world; the combine is to *get more* from the world and give back as little as possible. I believe in farmers co-operating in doing their work, and they will get more back in return because they will have given more. Farmers can afford to co-operate more than any other class. You will find merchants co-operating; if one gets a customer it is partly at the expense of the other; and still they co-operate although their interests are rather competitive—almost antagonistic. But in farming, when this man learns to breed better horses, the others likewise do so: they create a demand and prices go up because buyers are brought in to pay for the better animals. Co-operation is for the good of each and for the good of all. Thus men who farm would serve the country well by co-operation.

I am sometimes amused,—oftener pained at the foolish attitudes and actions of some farmers. Although they ought to help and encourage each other, yet they often try to hinder. If John Brown builds a big barn, then Jones will ask if somebody had to back his note in the bank to get the lumber. If a man gets better horses to have better stock, he is said to be putting on style, etc., etc.; and instead of this co-operation of sentiment which would help them along, jealousy and envy bitterly spoken keep them back. Those men who co-operate become economical. Co-operation reduces cost, and it is applicable to nearly all branches of farming and particularly so to dairying work.

A good while ago men used to do all their threshing in their barns by the use of an instrument,—rather than a tool,—wholly the property of each and often made at home, when every man threshed his grain with his own flail. Here was an illustration of what I shall call "single endeavor"; but men cannot afford to do that now. They have now steam separators and other appliances and gather together for two days at one farm to do all the threshing there. So economy of labor is promoted by co-operation, and that applies to all farming work.

In the making of butter, in 10 lb. or less lots, the women do not co-operate. Each does her own work alone and it takes six times more labor to make it, than it does in 200 lb. lots in a creamery; but it does not maybe cost any more, because a great many men hire their wives for their lifetime just for their board. It is a waste of time and a cruel unnecessary labor imposed on the women of the country, when they have to do unprofitable work, such as the making of butter in small quantities, when the very same butter would bring more than enough extra to pay for the manufacturing expenses, if made in a creamery. When the women of the country are relieved from this work, there will be fewer boys leaving the farms. They leave because the work is—too often—drudgery without pay. When the women are not overworked then the boys will remain at home, in brighter homes, and by their strong hands will further lighten the burdens of the women and leave them more liberty, leisure and opportunity for true housewively duties.

Then co-operation in dairying would increase the price of the product. When butter-making is carried on in the farm houses, the work under such circumstances does not yield a uniform quality; and uniformity is an essential, if we would have our butter fetch the highest price and become an article of commercial importance like our cheese.

Up in Ontario, over 99⅘ of all the cheese is made in the cheese factories. The same is true of the rest of Canada, to the extent that over 99 per cent. of all the cheese manufactured in Canada is made in cheese factories by co-operative methods. The result is that we stand first in the British markets for the quality of

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our cheese, and we send more cheese there per head of population than any other people on the whole earth. We send 42 per cent. of their cheese to the people of England, and why? Because we have co-operated and have given our cheese a quality of uniformity. As to our butter, we send her less than 2 per cent. of all the butter she buys abroad; but we make our cheese by the co-operative method and send 42 per cent. of all their imported cheese to England. When we make our butter in the same way and establish a standard of uniformity for it, then we shall probably send larger quantities of it than of cheese. I must remark that England buys twice as much butter abroad as she buys of cheese, and when we send them 42 per cent. of their imports of butter, there must necessarily be an increased volume of wealth coming this way. Co-operation would help us to establish a reputation there, and reputation has a peculiar value in all things,—you cannot weigh it, but it is of great worth. It is not measured by dimension, but it applies to everything. Reputation is not character. If you have a factory with a superior reputation and send to England one shipment of inferior goods, those inferior goods will sell for the same price relatively as did the previous good quality. Men buy on the established reputation of a factory expecting that the quality will be all right; and hence its reputation would carry it along all right that once, but it could not do so undeservedly very often. That is why we are trying to have such regulations that any Canadian may brand his cheese, assured that it will be counted a misdemeanor for anyone to use a similar brand on inferior cheese or on cheese from the United States going through our Dominion in bond. We have an excellent reputation and we certainly should have enough pride to look after it and protect it for ourselves. Co-operation has been a means whereby we have assured and established a reputation and a demand for our goods.

I think a Dairymen's Association for the Province of New Brunswick should be organised and that such an Association should receive a liberal grant from the public treasury of this Province. I do not think, so far as I can see, that any Province can spend public money to more advantage than for the agricultural education of its farmers.

The Association, when formed, and co-operation in factories will give farmers more enthusiasm in their work. If a man has to do specially difficult work he has to get up enthusiasm and put *himself* into his work; farmers must do their work in that way. This enthusiasm will help the farmers to do their work better, and they will have more profit from it. Co-operation would give more value to all property owned by farmers. I will not argue this, but will give one illustration. If a man wants to sell or rent a farm within a reasonable distance of a cheese or butter factory, he will advertise the fact, and for why? Because he will see an increased source of revenue through the cheese factory or the creamery, and thus their proximity increases the value of the property. Were every man to try to support the factory in his locality, he would get an increased price for his farm, if he wanted to sell; and if every man would support the creamery it would never go down, and it would be still more profitable to each one patronising it.

There is one other point I would like to mention. I give an instance which was mentioned in conversation this afternoon,—a co-operation of men to govern a township for themselves. That co-operation will educate these men in the Council, and then in the County Council; and so men of approved worth and ability are brought forward who were never heard of before. And the same is true of these co-operative factories. We never would have had these Farmers' Institutes, but for the cheese factories and co-operation in favour of creameries.

In the Kingdom of Denmark the people had very hard times to make farming pay, but now they proceed on what is called partnership dairying; and they have carried it on so successfully that they send the best and most of the butter sent to England from any part of the world. But that is not all; they learned to co-operate and to produce it so cheaply and get such a profit that they raise their stock on the skim milk, so that now they export more beef than we do from this vast Dominion.

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We cannot compete with the great wheat fields of the West, but we should not, so to speak, throw up the sponge and show the white feather in the cattle trade of the world.

Where does the cheap beef come from? A great deal from land worth $100 an acre, farmed by men who hire help at $45 a month, and I have seen it fed on corn ensilage costing 2½ cents per steer per day on high priced land. In old England, where land is worth $500 an acre, they still grow wheat against all the world, because they keep cattle and keep their lands rich. We have less competition here and good lands, and there is no reason why we here should not succeed in raising cattle cheaply in any part of our own Dominion.

If in any section, farmers wish to co-operate, a cheese factory of 500 cow capacity can be erected at a cost of $2,000 for a building of the best sort and construction, equipped with the best utensils that recent improvements can provide; and the cheese can be made at a cost of from two to two and a half cents a pound, including the drawing of the milk.

In Nova Scotia where they have a few co-operative factories, they paid more on an average for the milk than in Ontario; and if they can do that in Nova Scotia why not in New Brunswick. You have your home market and the people of England are always ready to pay and willing to pay a good price for good cheese. A creamery of 500 cow capacity to be operated upon the cream-collecting plan can be completed at a cost of about $1,500. The collecting of cream and the making of butter will cost about 4 cents per pound, and the persons sending the cream to the factory will be saved all the labor of manufacturing it into butter, as well as the cost of the tubs, etc. The larger the output, the lower the cost per pound of putting it on the market. I think the best kind of agriculture in dairying, for us to follow, is to make cheese mainly in summer months where farmers are raising much stock, support creameries during the winter and make one building do for both. When we make butter during the winter, more stock can be raised and the three businesses will run hand in hand; they will add largely to the profits of the farmer and by the production in such a manner, of butter, beef, cheese and bacon, the farmers will grow richer. In small districts where the area is large and the number of cows is small, it is well to establish the creamery on the cream-gathering plan.

You can never put too much water in milk if you always put it through the cow's mouth. There are 3·75 per cent. of fat in milk. Cheesemakers should learn how to prevent this waste of fat into the whey. It becomes dairymen to learn, that most of it may go to make cheese. If the milk is not properly aërated there will be less of this retained in the cheese. If the milk has not been perfectly coagulated the casein is wasted. There are 4 per cent. of sugar and ·07 per cent of ash in milk. Where the whey is kept sweet, it is good food for calves and hogs, but it may become poisonous by being in a foul state.

I think every cheesemaker, to succeed in his business, should so study those problems that he will be able to render intelligent answers as to why he wants certain treatment given to cows. The cheesemaker does not understand the whole of his business; he should study up the cow, the animal that makes the milk, and the food of the cow, so that when a man says "my milk is as good as my neighbour's," he can prove to him the why and wherefore of the effect of care and management, and adopt such treatments as are required for the quality of milk he handles. He will make better cheese and can make the whole neighbourhood respond to his own investigating, observing disposition. We want in our own country that our business men should look things squarely in the face; see them as they are and make other men think. If we can make them think wisely, it will make them successful dairymen, strong citizens and good men.

You can see that milk contains the very things necessary for animal growth, and all in correct proportions for food; and cream is merely a portion of the milk with a larger share of fat globules in it. So cream bears no definite ratio to the quantity of milk. You may have milk set in deep vessels, and you can take from the top 16 or 18 per cent. and call that cream, or half of the whole milk if you like.

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I know down in Halifax they call the bottom half, *the cream*, and give you that on porridge.

The animal that should supplement the cow in producing food and rendering service is the despised hog. Farmers seldom understand the hog, or they would keep more around their places. It does not pay to import $2,000,000 worth of pork and export hog feed to other countries. If we would feed the hogs ourselves and sell the bacon, we would have the producer's profit and the manufacturer's profit. It does not pay us to buy pork and rob the soil of all kinds of grain, to give others the manufacturer's profit. Besides this they,—the hogs,—are interesting in other phases of their behaviour. I have studied the hog a good deal. I used to feed a great many—600 a year; and I was not a prodigal boy either. They are worthy of observation in regard to general demeanour.

I went down on Monday morning to one of the hog yards, some years ago. The man whose business it was to look after them, had allowed an alcoholic fermentation to act in their whey. In this case it was quite pronounced, and I got my arms on the rail-fence and studied 70 drunken hogs for a time. 'Twas a study in animal husbandry and moral philosophy combined. There was "the funny hog," which would tickle the others and run along and laugh; then there was "the fighting hog" who would show his tusks and snarl; and "the sluggish hog" that would lie in the mud on the ground and grunt and grunt. I concluded that it was foolish for even a pig to let his appetite get the better of his judgment and will.

In feeding hogs, the man who feeds them well will succeed with them. You must remember that the hog has a preference for being clean. In feeding last year a great many pens, one side of each was kept clean for a week; afterwards the pigs themselves kept that clean for their bed. One week's education did it, and if the hog gets a good chance and a good example he is all right. Every farmer, with 100 acres, ought to feed 20 to 100 hogs. The common way of constructing the floors of the pens is unsuitable. If the floor slopes backward from the trough, it will be kept wet. That means sickly hogs that do not thrive well. I prefer to make the floor slant towards the trough. Twice the profit can be made when the hog lies dry all the while; and besides that, the health of the hogs is much better. Then the feeding trough should have its holding capacity in length and not in depth.

It pays to have them fed with good clean feed; that means the difference between profit and loss. They will take the waste from the table. It does not do, as is usually the case, to have it put into a tub or barrel that is never emptied or cleaned out. That becomes poison for the hog. It becomes fermented and sour, and makes bad blood. With the sow and young pigs taking it, why the consequence is that they die before they are ten days old. Every animal should get clean food, and even little pigs have the right to be well-born. Hogs fed on clean food should gain at least one pound for every four and a half pounds of grain used; a man can tell whether it is paying to keep them or put his labour to other sources of profit. If any man feeds his hogs too long, it costs more than he can make out of them. I quote the following from my last annual report as Professor of Dairy Husbandry at the Ontario Agricultural College:—

"Dairymen neglect one of the best servants they can have in the animal creation, when they do not avail themselves of the hog to aid in making money from the by-products of milk. The attitude of farmers towards the pig has been an unfriendly one. It is a popular, though untrue, saying that 'the only good Indian is the dead Indian,' and farmers seem to cherish a similar belief in regard to the hog. That opinion, however, is in direct opposition to the best interests of the men who keep cows for the manufacture of dairy products. If the man who keeps ten cows will fatten twenty hogs in the summer and half as many in the winter, he will find, perhaps to his amazement, that this little branch of business will bring him in more money and profit than he thought could be made from it. Whey is a valuable hog feed. There

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are nearly seven pounds in every hundred pounds of whey which the hog can use to advantage. The composition of sour whey may be given as follows:—

| | Per Cent. |
|---|---|
| Water | 93·00 |
| Nitrogenous substances | 1·00 |
| Fat | 0·50 |
| Milk Sugar | 4·25 |
| Lactic Acid | 0·50 |
| Ash | 0·75 |
| | 100·00 |

These elements of food value in whey should produce at least two pounds of live weight in hogs. One hundred pounds of whey, fed in the most judicious manner, should produce two pounds of pork; it will not do it when fed alone, but fed in combination with other foods it will. Sows, like cows, should be selected for their profit-making powers. A man who knows well enough that unless he has a good dairy cow he need expect no profit from her, often acts as though he believed that anything that grunts and squeals will make money for him out of its feed; but the squealing and the grunting are the main part of it with some hogs. In selecting a sow, she should be selected first for her length, then for her depth and then for her breadth. The three qualities should be valued in that order of merit—length depth and breadth. A sow should be made to farrow in March or April and in September. A breeding sow should never be fed upon decayed food. The waste from the kitchen and the table is wholesome feed for pigs when it is fed clean and before it becomes decomposed; but a never-empty and consequently never-clean swill barrel is a menace to the health of the hogs and a hindrance to profit. A breeding sow should always get as much salt as she likes to take; her food should be salted and she should have access to salt besides; she will not thrive without it. The quarters of breeding sows during the winter should be comfortable. They too often lie in and under strawstacks, or out in open sheds, and the other swine which are being wintered lie with them and on them to make more warmth. Dead pigs and sickly pigs from birth are the consequence. Their sleeping places should be well ventilated and dry.

A boar should be selected for length, depth and breadth. He should have proportionally large bones, for small bones are indicative of a weak constitution and a disposition to lay on lard instead of muscular meat. A plentiful supply of hair indicates a strong constitution, and a predisposition to lay on flesh.

Young pigs should be suckled for about three months; if they are weaned when five or six weeks old, they will not do as well. The sow can nurse them as well as not if properly fed, and the pigs will grow and thrive so much the better. Skim-milk butter-milk and bran should form some part of a milking sow's ration. It is profitable to scald or boil her feed until after the pigs are weaned.

The little pigs should always have access to cold water for drinking. In feeding and fattening these little pigs, they should have the trough room in length, not in depth. Many of the hog troughs, I see around the country, seem to have been constructed with the object of affording bath accommodation for the pigs, so deep and wide are they that the pigs take headers right into them. The feed room of the trough should be in length and not mainly in depth for all sizes of hogs, and it should be kept clean. Pigs have the reputation of being filthy animals, but a pig will keep itself clean if it gets instruction in that way for one week and a good example. The feed for little pigs should be sweet, not sour. In the souring of whey, some of the sugar is converted into acid. Lactic acid has no feeding properties. It has a slightly helpful digestive action, so that whey or milk which is sour will do a pig no harm, but part of the food value has been lost. Thoroughly sour whey is extravagant food and unsuitable for pigs. All meal fed with whey had better be of a mixture of grains: pease, wheat, middlings and bran are suitable. And let me remark in passing, that a farmer can frequently grow thirty bushels of "goose wheat" to the acre, in this



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time of cheap wheat, and he cannot market that so well any other way as through his hogs. With their mixed feed, pigs should receive a liberal allowance of salt every day; charcoal or wood ashes are very beneficial when hogs are fed mainly on whey. A very small quantity of saltpetre and sulphur once a week would help to keep them thriving when the whey is unavoidably sour, as it will sometimes become in spite of the best of care. A mixture may be made of eight pounds of salt, eight pounds of charcoal, half a pound of saltpetre and one pound of sulphur. The hogs may be allowed to take all they like of the mixture. Pigs should have some green feed in the summer time when penned up; half an acre of clover will yield the best returns in pork when fed to pigs that are also given whey and grain in combination therewith.

The sleeping quarters of pigs that are fed should be dry, clean and well ventilated. The best weight at which to sell hogs in order to realise the highest price and the best returns for food consumed is from 150 to 200 pounds, live weight."

The following tables give the observed results from five of the pens of hogs that were fattened during the season:—

On Aug. 9th sixteen hogs were separated into three pens, containing 6, 5 and 5 respectively. They were divided to be as near alike as possible in age, size and breeding. None of them were pure bred, though most of them showed Berkshire or Chester White points. They were all fed on middlings only, with salt and water, and were allowed as much as they could eat, being fed three times a day. The middlings were mixed with cold water in the troughs immediately before the time of feeding.

| | Number of Hogs. | Weight Aug 9th. | Weight Sept. 13th. | Gain. | Middlings Consumed. | Middlings consumed per lb. of increase live weight. |
|---|---|---|---|---|---|---|
| | | Lb. | Lb. | Lb. | Lb. | Lb. |
| Pen 1 | 6 | 586 | 924 | 338 | 950 | 2·81 |
| 2 | 5 | 465 | 726 | 261 | 836 | 3·20 |
| 5 | 5 | 399 | 673 | 274 | 908 | 3·31 |
| | 16 | 1,450 | 2,323 | 873 | 2,694 | 3·08 |

The average live weight of the hogs on Aug. 9th was 96.6 lb. each
" " " Sept. 13th " 145.2 "

The object in feeding the middlings was to prepare the three lots for an experiment in the feeding of corn-meal alone, pease-meal alone and a mixture of barley-meal and middlings alone in the fattening of these 16 hogs. The hogs of each of the three lots in pens 1, 2 and 5 were weighed every week. The meal in each case was fed, as were the middlings, mixed with cold water in the trough, immediately before the hogs had access to it. They were fed three times a day and each pen was allowed as much as the hogs would eat. In the tables I have arranged the figures under *four* feeding periods of four, four, four and three weeks each.

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Pen 1—Six hogs fed on cornmeal only with water and salt, Sept. 13th to Dec. 28th.

| Feeding Period. | Weight at beginning of feeding period. | Weight at end of feeding period. | Gain. | Cornmeal consumed. | Cornmeal consumed per lb. of increase live weight. |
|---|---|---|---|---|---|
| | Lb. | Lb. | Lb. | Lb. | Lb. |
| September 13th to October 12th | 924 | 1,184 | 260 | 1,111 | 4·27 |
| October 12th to November 9th | 1,184 | 1,447 | 263 | 1,174 | 4·46 |
| November 9th to December 7th | 1,447 | 1,666 | 219 | 1,161 | 5·30 |
| December 7th to December 28th | 1,666 | 1,842 | 176 | 911 | 5·17 |
| September 13th to December 28th | 924 | 1,842 | 918 | 4,357 | 4·74 |

Pen 2.—Five hogs fed on pease-meal only with water and salt, Sept. 13th to Dec. 28th.

| Feeding Period. | Weight at beginning of feeding period. | Weight at end of feeding period. | Gain. | Pease meal consumed. | Pease meal consumed per lb. of increase, live weight. |
|---|---|---|---|---|---|
| | Lb. | Lb. | Lb. | Lb. | Lb. |
| September 13th to October 12th | 726 | 945 | 219 | 1,049 | 4·79 |
| October 12th to November 9th | 945 | 1,140 | 195 | 931 | 4·77 |
| November 9th to December 7th | 1,140 | 1,390 | 250 | 1,126 | 4·50 |
| December 7th to December 28th | 1,390 | 1,534 | 144 | 815 | 5·66 |
| September 13th to December 28th | 726 | 1,534 | 808 | 3,921 | 4·85 |

Pen. 5—Five hogs fed on a mixture of barley meal and middlings alone with water and salt, from Sept. 13th to Dec. 28th.

| Feeding Period. | Weight at beginning of feeding period. | Weight at end of feeding period. | Gain. | Feed Consumed. | | Mixture of barley meal and middlings consumed per lb. of increase, live weight. |
|---|---|---|---|---|---|---|
| | | | | Barley. | Middlings. | |
| | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. |
| September 13th to October 12th | 673 | 877 | 204 | 399 | 399 | 3·91 |
| October 12th to November 9th | 877 | 1,070 | 193 | 436 | 419 | 4·43 |
| November 9th to December 7th | 1,070 | 1,275 | 205 | 486 | 489 | 4·75 |
| December 7th to December 28th | 1.275 | 1,403 | 128 | 351 | 361 | 5·56 |
| September 13th to December 28th | 673 | 1,403 | 730 | 1,672 | 1,668 | 4·57 |



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The following table is arranged for comparison of the quantities of feed consumed per lb. of increase live weight:—

| Feeding Period. | Corn meal consumed per lb. of increase, live weight. | Peas meal consumed per lb. of increase, live weight. | Mixture of barley meal and middlings consumed per lb. of increase, live weight. |
|---|---|---|---|
| | Lb. | Lb. | Lb. |
| September 13th to October 12th | 4·27 | 4·79 | 3·91 |
| October 12th to November 9th | 4·46 | 4·77 | 4·43 |
| November 9th to December 7th | 5·30 | 4·50 | 4·75 |
| December 7th to December 28th | 5·17 | 5·60 | 5·56 |
| September 13th to December 28th | 4·74 | 4·85 | 4·57 |

On November 9th, after a period of preparatory feeding, eight hogs of similar age and breeding were weighed, and left four in each of two pens. They were not pure breed, but in appearance would have passed for Berkshire hogs. A test was undertaken with them to obtain some information on the value of rape ensilage for fattening purposes. The four hogs in pen 6 were fed on middlings only, with water and salt mixed in the trough before the hogs were allowed access to it. They were fed three times a day, and were fed as much as they would eat. The four hogs in pen 7 were fed on about one-third the quantity of middlings consumed by the hogs in pen 6, and were allowed as much rape ensilage as they would eat. The treatment otherwise was alike. The feeding lasted from November 9th to December 21st, when the supply of rape ensilage was exhausted.

The following table shows the comparative quantities of middlings and rape ensilage consumed:—

| —— | Feeding Period. | Weight at beginning of feeding period. | Weight at end of feeding period. | Gain. | Middlings and rape ensilage consumed. | | Middlings consumed per lb. of increase, live weight. |
|---|---|---|---|---|---|---|---|
| | | | | | Middlings. | Rape ensilage. | |
| | | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. |
| Pen 6: 4 hogs | Nov. 9th to Dec. 21st | 905 | 1,164 | 259 | 1,491 | ..... | 5·75 |
| 7 4 do | do do | 905 | 1,084 | 181 | 487 | 2,840 | |

According to this one test, one pound of middlings is equal to 5.12 lb. of rape ensilage for the production of pork. The *cost* of the rape ensilage in this case could not be correctly calculated.

I desire here to call attention to the fact that in the feeding of the hogs in Pens 1, 2 and 5 from August 9th to September 13th on middlings only, from an average weight of 90·6 lb. each up to 145.2 lb. each, *only* 3·08 *lb.* of middlings were consumed for each pound of increase live weight, whereas in feeding the hogs in Pen 6,

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on middlings only, from an average weight of 226·2 lb. each up to 291 lb. each 5·75 lb. of middlings were consumed for each pound of increase live weight.

The twenty-four hogs of Pens, 1, 2, 5, 6 and 7 were killed on December 31st and January 1st. The last feed was given to all the hogs on the morning of 30th December. The hogs of Pen 1, and numbers 4 and 5 of Pen 2, were killed on January 1st. The following table will give some interesting and probably useful information. The live weight of each hog was taken immediately before it was killed, and the dead weight was taken immediately after it had ceased to bleed. The hogs were all scalded, scraped, dressed and hung up where they would not freeze. On January 6th the dressed weight was taken:

| Pen. | Number of Animal. | Fed on | Live Weight. | Dead Weight. | Dressed Weight. | Weight of lard on guts. | | Per cent. of shrinkage from live weight to dressed weight. |
|---|---|---|---|---|---|---|---|---|
| | | | Lb. | Lb. | Lb. | Lb. | Oz. | |
| 7 | 1 | Middlings and rape Ensilage. | ..... | ..... | 218¼ | 5 | 2 | 14·3 per cent. |
| | 2 | | ..... | ..... | 254½ | 5 | 10 | |
| | 3 | | 260 | 254 | 224 | 6 | 2 | |
| | 4 | | 249 | 242½ | 212 | 4 | 14 | |
| 6 | 1 | Middlings. | 298 | 292 | 257 | 7 | 0 | 13·3 per cent. |
| | 2 | | 282 | 273 | 245 | 6 | 11 | |
| | 3 | | 259 | 252 | 225 | 6 | 2 | |
| | 4 | | 305 | 300 | 264½ | 6 | 11 | |
| 5 | 1 | Barley-meal and Middlings. | 273½ | 26·½ | 229½ | 7 | 9 | 15·6 per cent. |
| | 2 | | 283 | 277 | 242½ | 10 | 1 | |
| | 3 | | 238 | 232 | 201½ | 7 | 14 | |
| | 4 | | 298 | 291 | 251 | 6 | 4 | |
| | 5 | | 253½ | 246½ | 211 | 6 | 0 | |
| 5 | 1 | Pease-meal. | 289½ | 282½ | 238½ | 7 | 14 | 17·0 per cent. |
| | 2 | | 288 | 282½ | 242 | 9 | 12 | |
| | 3 | | 301 | 293½ | 246 | 9 | 0 | |
| | 4 | | 279½ | 273½ | 232½ | 7 | 12 | |
| | 5 | | 312½ | 305½ | 261½ | 6 | 15 | |
| 2 | 1 | Corn-meal. | 295 | 290½ | 257½ | 6 | 2 | 14·1 per cent. |
| | 2 | | 342½ | 336½ | 293½ | 9 | 0 | |
| | 3 | | 241 | 235½ | 206½ | 6 | 10 | |
| | 4 | | 332½ | 326 | 287½ | 5 | 13 | |
| | 5 | | 283 | 276½ | 238½ | 8 | 11 | |
| | 6 | | 277½ | 271½ | 237 | 7 | 4 | |

One hog of each lot was cut through in front of the shoulders, behind the shoulders and in front of the hams. It was intended to photograph these sections, had the difference between the proportions of fat and lean from the different kinds of feed been decidedly apparent. The difference would not have been evident to the eye from an exact photograph. A few of the notes made on the spot are transcribed here.

*Corn-Meal Fed.*—Lean meat rather brighter in the color than the other; equal to the pease-meal fed, in firmness and proportion of fat and lean; lard more chalky in shade than others.

*Pease Meal Fed.*—The color of the lean meat hardly so bright as the corn-meal fed.

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*Barley-Meal and Middlings Fed.*—Color of the lean meat rather pale; larger proportion of lean to fat than in the corn and pease-meal fed; flesh and fat softer in body than in the two other lots.

In the following table is shown the order of quality under the three heads of 'color,' 'largest proportion of lean to fat,' and 'firmness of flesh and lard.'

| Order. | Color. | Largest proportion of lean to fat. | Firmness of flesh and lard. |
|---|---|---|---|
| First. | Corn-meal. | Middlings and rape ensilage. | Equal (Corn-meal. / Pease-meal.) |
| Second. | Pease-meal. | Middlings. | |
| Third. | Barley-meal and middlings. | Barley-meal and middlings. | Barley-meal and middlings. |
| Fourth. | Middlings. | Equal (Corn-meal. / Pease-meal.) | Middlings. |
| Fifth. | Middlings and rape ensilage. | | Middlings and rape ensilage. |

Other hog-feeding has been in progress. From the data given in these tables, and from conclusions safely reached by observation, I desire to point out that as a hog becomes older and heavier there is a gradual increase in the quantity of food consumed per pound of increase live weight. It is not prudent to base a scale of the per cent. of increased consumption of feed upon these few tests, but I may mention that in the case of feeding hogs upon middlings only from 226.2 lb. each up to 291 lb. each (pen 6), they consumed EIGHTY-SIX PER CENT. more feed for every pound of increase live weight, than did the hogs from 90.6 lb. each up to 145.2 lb. each.

By comparing the qualities of feed consumed per pound of increase live weight by the hogs in pens 1, 2 and 5 on corn-meal, pease-meal and barley-meal and the middlings respectively during the first eight and the last seven weeks the following results appear:—

| Feeding Period. | Corn-meal consumed per lb. of increase, live weight. | Pease-meal consumed per lb. of increase, live weight. | Mixture of barley-meal and middlings consumed per lb. of increase, live weight. |
|---|---|---|---|
| | Lb. | Lb. | Lb. |
| September 13th to November 9th | 4·36 | 4·78 | 4·16 |
| November 9th to December 28th | 5·24 | 4·92 | 5·06 |

The increased per cent. of the consumption of feed per lb. of increase live weight in the hogs in the second period from Nov. 9th to Dec. 28th over the rate of consumption during the period from Sept. 13th to Nov. 9th, is as follows:—

In corn-meal fed hogs, 20 per cent. more feed per lb. of increase live weight.

In pease-meal fed hogs, 3 per cent. more feed per lb. of increase live weight.

In barley-meal and middlings mixture fed hogs, 21 per cent. more feed per lb. of increase live weight.

I consider that it is possible by a judicious mixture of grain in hog-feeding to obtain one pound of increase live weight up to 200 lb. for every four pounds of grain fed.

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The floors of our feeding pens all have their fall towards the trough; that arrangement leaves the back part of the pen always dry for a sleeping place.

Hog manure is one of the best fertilisers; in feeding hogs, little is taken off the farm, much is left on it of manurial value, and satisfactory money returns may be realized in addition. For these reasons, I believe the hogs of this Dominion are an unrecognised and undeveloped source of wealth for the men who endeavor to understand and use them well."

As to the breed of hogs, I will tell you a story, but—first how often to feed them. Three times a day is not too often. The hog does not take any harm from having food before it all the time. It is not like a horse or a cow in that respect.

I was going to speak of the kind you should keep. Some say a hog with a long back is best; others speak of the breadth of the pig, and there are some people with whom length of the body in front of the ears is the favourite point; but that is not a good kind.

An American—a typical Yankee—went down to South Carolina to see an exhibition there, and he was very much disgusted to see this latter kind of hog getting the prizes. He had hogs himself and chuckled within himself that he would carry off all the prizes next year. When he returned home, he went on to tell the neighbours what those long-nosed animals were like, and said, "Down in South Carolina they have but one way to tell when pigs are fit to kill; they take them up by their ears and when their hams will balance their snout, they kill them, they are fat." So the Yankee thought at the next exhibition he would take down his pigs. He did so and had them entered. Presently the judges came up. One glance at his round pigs was enough; they passed by on the other side. He went up to them to remonstrate and remarked: "Did you see my pigs,—them short-legged, broad-backed pigs?" "Oh yes! we looked at them." "Then why in thunder didn't you give them a prize. They are broad-backed, round-hamed, short-legged, fine-boned"——— And so he was rattling on in the usual American modest style, to enumerate their excellencies, without a word about their defects, when he was interrupted by a slow-speaking Southern judge who said, compassionately: "Stranger, you don't seem to just understand and catch on to the needs of these 'ere parts. Your pigs ain't quite adapted to the wants of this community. They ain't built to suit our circumstances altogether, because you see a pig that can't run twice as fast 's a nigger 's no good to us; he's a gone hog."

## THIRD ADDRESS—AGRICULTURAL EDUCATION.

I have no intention of discussing this subject with you to-night in any exhaustive way, or as I should like, and will at this hour have to content myself by referring to a few lines whereon I think the education of farmers could be improved. It would be a good thing for the farmers of this country in some respects, if a practice which exists in the older countries was in vogue here, namely, that of having men educated in agricultural schools on agricultural subjects. In Germany, England, Scotland and Ireland, men are specially instructed and trained how to have farming done in the best way, and then they apply their skill and knowledge through other men's hands, often those of their tenants. The men there who have the agricultural education do not perform the farming work, but they do the thinking and the other men do the tilling.

In our own country we have a happier state of things in opportunity. Here we have, or try to have, the one man competent for both spheres of action; and the man whose own head rules his own hands needs a better education, that he may rule wisely and well. Farmers ought to be taught that they rule their farms and their bodies for themselves and other people. That truly needs education. I can say but a few things about it to-night. Skill is always the product of education. The man

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who is unskilful does not do as much in the world as the man who is skilful. Skill is not often understood as being the product of education. When a man learns to fell trees well, he is educated in felling trees. That is, he has power to apply his knowledge; but acquiring knowledge with a mere facility to remember things is not education.

I find some men who have so laden themselves with information that they go about in the world burdened with the load of their lore and learning, and they are tired all the while—too tired to do anything useful and too tiresome to encourage others to do anything. Education has in itself the quality of enabling a man to put his knowledge under his feet that he may be uplifted thereby, with his hands free and head clear to lay hold of life's tasks and perform them well. A man with his footing sure, will be safer than the other man who has not that advantage by his education.

A man educated in felling trees knows how to use an axe and does it. I learned to fell trees. I could read a good deal about it, but my reading could not help me to fell trees. The man who could not read at all, would readily bring energy and a knowledge of his tools to his work and apply acquired skill to the doing of it. Though I might be rather more learned, yet for his purpose he would be better educated than I. In all educational efforts, I think every man who wishes his race well should remember that education is intended for the purpose of enabling a man to bring things to pass because of his being and his doing.

The farmer needs that kind of education for his calling and business. He requires a knowledge of the transactions into which he enters, so that he may see wherein his profit will lie between the cost and the price he can obtain or realize. Many a boy makes a failure of farming because his father never gave him a chance to work and solve out the real problems for himself until he was thrown wholly on his own resources, and then he was unequal to the difficulties from lack of a practical business education. A knowledge of how to buy and sell well and have a profit, how to raise crops and animals, how to reduce the cost of raising them and then how to sell well and have so much profit the more, are branches of a farmer's boy's education that should not be neglected.

Farming is not only a business, it is a trade; and the farmer needs skill in workmanship, as much as does the carpenter or other workmen. You would not think a carpenter educated until he could lay his boards close and make good joints. I do not think a farmer is educated to plough until he can plough straight and even. The boys must be encouraged to plough well, to tend the cattle well and they will take a pride in their work, because as a man finds scope for his own thought he recognises he is doing a man's work and then it is never drudgery. So a man will express himself through his work. There are people who think it is ennobling only to give expression through the voice and pen, and this thought is bolstered up by men who ought to know better. I will give you illustrations.

I once had a chance when a younger man of hearing General Grant speak. It was after his second term in the Presidential chair. He did not speak more than five minutes. I sat and listened, rather amazed. I did not think much of his speech. He blundered and stammered a little, and at last sat down, apparently covered by confusion. Would I be justified in saying he had no power of expression? You see the man's genius and will could express themselves in a far stronger way than by a few words. He was the instrument that hammered the two dividing parts of a great nation into unity.

A painter cannot perhaps talk much, but yet he can give expression on canvas through his brush. You have a sculptor who cannot thrill you with eloquence, but he can put into his statuary a more durable idea than can the finest speaker that ever lifted his voice. And the farmer should learn to express himself through his work, so that his farm will represent his idea and thus as he expresses himself in his work and addresses himself to his work, he finds scope for himself. Such exercise is education. He wants and needs some knowledge to begin with; and education will lead it up to doing something and him to being somebody.

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Agriculture is also a profession. It is the general opinion that the men who have the highest class work to perform are the ones who perform professional duties. When this country was first settled, men had to remove natural obstacles,—physical obstructions,—apply the fire brand and so become devastators. Trees had to be felled, and it required education of a sort to swing the axe efficiently. Then we came to a stage when men's occupations were more constructive. Farmers had to replace on the surface, plants more serviceable than those which had been destroyed. Constructive work demands knowledge and education; and the conditions have changed so much that farmers need to apply themselves with skill to the new work.

If a man sells statuary he does not sell it at so much a ton, but when he sells statuary he sells himself, he has driven his chisel and used his mallet and transferred himself. He sells himself in the expression of the marble that he has made to look beautiful out of the dead block. It is the same with the man who sells a horse; he can embody his skill in the animal and thus by the exercise of his skill in the production of a superior horse, he secures a bigger price for it.

We have done some things in the past through the school house but man wants to know more of his work. The farmer's boys will by knowing more of their work and of their calling, be the better enabled to make it more productive. The school-house does not furnish the information as yet. While a boy is learning to read, why should he not learn how plants grow and how agriculture should be prosecuted. He learns to read, sometimes in studying a narrative, of how some illustrious villain a thousand years, or less ago, cut off the heads of several of his wives and made himself as useless as he could be. Instead of that, why could he not read something that would be helpful and useful in his life? When we teach our boys and girls to read and write and give them something good and noble to read about, then will they become better boys and girls. I would not rob the school boys of their heroes and great men, but I would have it, so that the boys could learn the history of their country from books which teach them something of the great men of the past.—the men who helped to make homes comfortable, clothing good and cheap, and who showed how food could be procured more readily and abundantly,—the men who lifted the people up with noble thoughts and the example of useful well-spent lives.

We are going to have in Ontario very soon, a book on agriculture for boys and girls to read in the schools. A boy is in need of information when he goes to school, but an old man cannot hope to go successfully back to school days again. However, a Farmers' Institute is a school-house for grown up boys and girls who live on farms, and that is the place to get information, stimulation, inspiration and direction. An agricultural paper is an additional aid to widen out a man's knowledge and thought and give him an acquaintance with things he would not otherwise probably hear about.

An organised Farmers' Institute or club is a sort of College in which farmers are led up to newer phases of their calling; they discuss the topics relating to agricultural improvements and all become benefited by them. Then we have Experimental Farms in nearly all of the Provinces. Those of the Dominion Government are the key-stone of the arch of our educational institutions for farmers. Through them the people are informed of the results of experiments, and their work sheds out the kindly light of knowledge to the poorest and humblest farmer in the realm, as well as to his richer brother of wider opportunities.

Therefore an Agricultural Experimental Station where a man can go and see fine fields and buildings is merely a school-house, is a place to which three millions of non-resident pupils should look for information; and if anything more than another makes diligent, earnest men of the officers of these stations, it is to think that 3,000,000 of people are looking up to them as those from whom they can learn something of value. They are educational institutions intended to help those non-resident pupils to do their work better, and if they do that well, they will fill the bill; but as soon as they try to make money direct they should be abolished outright.

I will not speak of the Central Experimental Farm at Ottawa. But of such in general, I would say that their object is to inform, stimulate, direct and inspire the

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farmers with enthusiasm, and as they do these things, they become educational institutions of the best kind to help even men who do not want information.

Education teaches the farmer the cost of his products and his prospects of gain. Too much stress cannot be laid upon the importance of co-operation and education. We must co-operate if we are to hold our positions in the agricultural world. Men sometimes say, "One farmer cannot do anything, and therefore one farmer won't do anything." When a man says "I won't," he is a great deal worse off than when a man says "I can't." When we say "we want to do better in this business," and if we say "we can" and "we will," we will have waked ourselves up to the prospect of prosperity in agriculture. We can do that by co-operation. Some men want division. They may be right, but co-operation is always good and always successful, when it operates towards a good end. They say the farmers have no cohesiveness, and therefore they will stand apart. When farmers learn to co-operate, all the manufacturing combines and all the commercial combines that injure their interests, and make our men complain of hard times will be broken up, and they will have liberty and wealth because they have skill. When a man sells anything that he farms, he sells a threefold commodity—material, labor, skill and the strength of the old sun. When a man sells wheat to the amount of 200 bushels, he sells away $48 worth of material from his farm that is taken from his soil. When he sells at $1.00 per bushel, he has $152 left for labor and skill. When he grows 10 bushels of wheat to the acre he has to cultivate 20 acres. He has $152 for the rent, the taxes, seed and other expenses; and the balance is for labor and skill. Figure it out and you will find he has 30 cents a day for himself. That is not the price of skilled labour. If he puts skill into the soil by having his manure put there, and cultivates properly, he may have 30 bushels to the acre. I know a man who in 1888, had 32 bushels to the acre, weighing 66 lb., whereas his neighbor had 19 on better land, and this vast difference is traceable to the fact that his neighbor did not put skill into the soil. When a man sells hogs that weigh 250 lb. at 12 months of age, he is not putting skill into the business. The hogs have boarded on him too long. If a man keeps the wrong kind of hog, whose main occupation is to move around the front yard and furnish music for the family at dinner time, he is not selling skill that way; he is trying to sell squeal, and squeal is unmarketable. It is very much harder to sell skill than to sell material, but the things that are hard to do are worth the doing. Every man in dairy farming who sells skill through these avenues, will not only benefit his land and enrich his pocket, but he will make himself a more skilful man, and the man who does that has the highest reward. Let the young farmers in our Dominion be encouraged and trained to sell skill, and in selling skill they will become a prosperous, contented and powerful people, *such* a powerful people that our American cousins will want to link their fortunes to ours, and put themselves under our protection. Don't think that skill can be legislated into a people; it is a product of self-reliant education.

The men who above all others are supposed to sell skill without physical labor are lawyers. That is the nature of their occupation and that is one reason why I honor a man who follows law honorably. To advise well requires skill. A lawyer may get up and speak for hours in favor of his client's case; he labors for his client; he does not perhaps bring to his work any skill and so is only worth so much by the hour—sometimes 200 times less than nothing is about the value I would put on it. But a skilful lawyer thinks out his case. He sells skill and may not talk for half an hour, but in that time he shows his skill and labors less. Such a man is worth far more by reason of his skill than the lawyer who talks without skill. So in the production of cheese, the raising of beef and pork, skill is needed. It is skill that pays best in all things, and skill is the product of education.

I must now close my talk as the hour is late. But I would have the boys in this land believe that those living on farms and coming from farm homes have the best chance of *being somebody*, and of having everything that the heart of man can honestly desire. I would not have them thinking that these could only be attained

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by those born into or coming from the homes of the rich. As a rule the boys who come from the farm can best afford to render the world rich service; they have been trained to exert themselves.

I go into the field and walk along a nice attractive place by the bank of a beautiful stream. I see some lovely shrubs overhanging. I look for a bird's nest and I see one snugly and cosily hanging to a bush. It is very pretty and soft, lined with all the dainty stuffs the parent birds could find. The moss, feathers and everything in it are luxurious. I wait and see where the birds go. They flit and go twittering along that stream bank in search of food. They only twitter along that stream. I then go across the field and find another nest in an exposed hole in the ground; nothing there is luxurious. I wait to see the young leave that nest. They soar away singing, and delight every ear, though they come from the plain nest of straw. Then I go away further and find another nest at the top of a rude crag. I see a little heap of sticks—no luxurious comfort there. But from the eyrie, by and by the young eagles rise and dare the very sun in their circling flight until they leave the gaze of man. The birds of song and strength come from plain nests. The farm home, when the hard work is mixed up with love, and the home has heaps of that in it, is the best place on earth from which to start in life. I would have the homes of farmers such, so that the boys would stay on the farm, become educated to love and follow the noble calling and thus have the best chance of making the most *of* themselves and a sure competence *for* themselves and those dependent on them.

## III.—THE WORK OF TRAVELLING DAIRY INSPECTORS AND INSTRUCTORS.

The rapid and steady growth of the cheese-making industry of Canada, both in regard to the volume of business and the area occupied, prove satisfactorily that it is well adapted to the conditions of our farmers, and is competent to increase the profits of those who follow it intelligently. Cheese factories are a comparatively new feature in agricultural work. The first one on this continent was established near Rome, N. Y., in 1851, by Mr. Jesse Williams. Mr. James Burnett, of Farnham Centre, Que., erected a building and started a co-operative cheese factory in 1863. The late and deeply lamented H. Farrington, of Norwich, Ont., introduced the factory system into Ontario. His factory was erected near his home and began operations in 1864. From these small beginnings, the manufacture and exportation of cheese have grown until it now furnishes the largest value in products of any single fruit of the farmer's enterprise. But for the occasional help which the industry received in its infancy from the Dairymen's Associations, the holding of Conventions and the dissemination of useful information by enterprising and public spirited individuals, it might have languished and probably would have died, as indeed it did in a few districts quite as well adapted in natural resources to its successful prosecution as those wherein it has succeeded. The value of the assistance through these educational organisations of dairymen which has been given in the past, has been generally recognised; and from a business point of view can hardly be over-rated by those engaged in the business. Dairymen in other countries who are now our keen competitors, are employing the services of trained and skilled *travelling instructors*, some of whom have gone from our own young Dominion to the strongholds of dairying in the British Isles, and that in order to improve the quality of their products. It becomes our necessity, as well as our duty, if we would maintain our reputation and the foremost place in the English markets which we have won, to give our makers at least equal assistance in the prosecution of their work, that they may be enabled to cope with the new and increasing difficulties that beset them. The dairymen in Ontario were the first to engage the services of a travelling instructor in the person of the late Professor L. B. Arnold. Since then that useful work has been improved upon and enlarged in Ontario and Quebec, and also to a limited extent in the Province of Manitoba.

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As every pound of inferior cheese and butter, which find their way to any consumer's table, hinder consumption and curtail demand, so their manufacture inflicts an injury on every producer of dairy goods. The reputation of Canadian cheese, as a whole, modifies in some measure the relative prices received by every factory. To a slight extent, the same holds good in the creamery business. Our reputation is maintained, not at the standard of our very best factories, but by the average quality of all the goods we make and export. A few of the very best factories won for us at first, our now undisputed reputation for superiority, especially in the quality of our cheese; and that came mainly as a consequence of the frequent visits of a few individuals who were competent to instruct, to advise and to guide makers into the carrying out of the best practices. The factories with the very best reputation may expect as much benefit to accrue to their patrons, from the efficiently performed work of inspectors and instructors as may those with reputations not so high or so well known. Whenever a substantial advantage can be made to accrue to the dairy business as a whole, every patron of every factory is benefited to a more or less degree.

I desire to point out here, a few of the respects in which more thorough and more general inspection of factories, examination of milk, and instruction of cheese-makers will be profitable.

1. There is a growing impression, partially justified by the facts, that at many factories a few patrons tamper with the milk to a greater or less extent. Nothing will sooner damage a factory seriously, than a well-founded suspicion in the minds of some of its patrons, that some of the other patrons are getting more than their just due through the furnishing of adulterated or inferior milk, which is pooled at the common value per hundredweight with their own, which is honest as from the cows and in good condition. Adequate legislation now provides for the certain punishment of any patron who is guilty of furnishing milk to a cheese factory, creamery, or condensed milk factory, from which any cream has been removed, any strippings held back, or to which any water has been added. The matter of legislation on this subject is treated of more fully under the next following head of this report.

The official instructors should be provided always with instruments equal to and suitable for use in the detection of such frauds. The latest of the milk-testing apparatus, which has been devised by Dr. Babcock, of the Agricultural Experiment Station of Wisconsin, provides for a rapid, easy, effective and cheap method of determining the per cent. of fat in milk. Two dozen or more samples can be tested accurately in the brief space of 15 minutes.

2. The benefits to cheese-makers would arise mainly from the instruction which they would receive from the visits of these travelling instructors. The opportunities afforded to these instructors by visiting a different factory every day, equips them for giving many useful hints and suggestions to even the most advanced and successful makers whose factories they may visit officially. Then a cheese-maker's work is such a tax upon his time, that little chance is left for him to visit neighboring factories for the comparing of notes with his fellow-workers. He may fall easily into some wrong method or treatment, without discovering his mistake until a great deal of damage and loss have been sustained. Milk is a commodity so susceptible and perishable in its nature, that a little variation in the treatments at any stage of the process of its manufacture, may change very seriously the quality of the cheese made from it. Another gain to the patrons and to the cheese-makers would arise from the supervision which should be exercised by these travelling instructors who might be *expected* to drop into the factory at an *unexpected* time. Such an uncertainty as to when a competent outside individual would examine the condition of a factory and its utensils, would exercise a wholesome and stimulating influence upon the cheese-maker, towards the keeping of his factory in the very best of condition all the time. Then such instructors and inspectors would be available for consultation when cases of unusual difficulty arose in a factory or neighborhood.

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### CONTRIBUTIONS TOWARDS EXPENSES.

To meet the expenses incurred by the engagement of the services of travelling instructors and inspectors, each factory should agree to contribute a small sum annually. It has been urged that since the patrons and cheese-makers directly derive a benefit from the work of these travelling dairy teachers, they should pay for them wholly themselves. While that appears to be fair, in a theoretical statement of the question, a practical difficulty arises to the effect that the farmers who most need the help, if left to provide it wholly for themselves, would not avail themselves of it. The Governments of the several provinces in the past have indicated by their acts that they were disposed to render some financial assistance towards securing the employment of these instructors; and the additional gains in direct receipts by the farmers, and the better reputation won for the products which have been exported, have justified abundantly the expenditure of the small sums that have been given for that object.

### FORMS OF APPLICATION.

The plans that have been adopted in the several Provinces for the engagement and payment of these inspectors are slightly different. The following form will show the rule which was followed in the western part of Ontario in 1889:—

*Return this Form when Properly Filled Up to*

## PROF. JAS. W. ROBERTSON.

ON BEHALF OF THE ..... Cheese Factory Situate on Concession ..... Township of ..... County of ....., I intimate to you that this factory will contribute to the fund for the Employment of Cheese Making Instructors and Milk Inspectors, the fees as fixed by the Executive Committee of the Dairymen's Association of Western Ontario, that is to say:—For every Factory making up to and under sixty tons of cheese, $8; for every factory making over sixty and up to eighty tons of cheese, $10; and for every factory making over eighty tons of cheese, $12; as based upon last year's production. This factory last year made ..... tons of cheese, and I agree to pay ..... dollars, to be paid by the 1st of August, 1889, to the Secretary of the Dairymen's Association at ..... Ont.

(Sign here.) .....

..... P.O.

Please send to ..... P. O., Ont., ..... Copies of Bulletin on Milk for Cheese factories, for free distribution among the patrons of ..... Factory.

N.B.—Write address very distinctly, and ask for only as many copies as there are patrons.

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In Eastern Ontario a rule was adopted which required each factory which desired the services of the travelling Instructor and Inspector to contribute $5.00 per visit.

In the District of Bedford, in Quebec, the following form was used by applicants for the services of the Inspector engaged by that Association:—

TO THE SECRETARY, DAIRYMEN'S ASSOCIATION FOR THE DISTRICT OF BEDFORD.

COWANSVILLE, QUE.

The.....Cheese Factory, situated on Lot....., in the Township of....., in the County of....., hereby makes application for the services of an inspector and instructor, to be employed by the Dairymen's Association for the District of Bedford, for the season of 1890; and it is hereby agreed on behalf of the patrons or manufacturer at said cheese factory, that a sum equal to fifty cents per ton of cheese manufactured during the season of 1890 will be paid to the Secretary-Treasurer of the Association on or before 1st August, 1890, in consideration of the services of such Inspector and Instructor, whose duty it will be to visit each factory, which subscribes to the fund, as frequently as possible, to inspect the quality of the milk, and to advise, instruct and assist the cheese-maker in turning out cheese uniformly fine by the latest and most approved methods.

.....Que., .....

.....1890. ..... .....Post Office.

SYNDICATES.

In other parts of the Province of Quebec, provisions were made for the formation of syndicates of manufacturers of cheese and butter. These, by a common agreement, consented to have the special services during the season of a travelling inspector and instructor, who had to be duly qualified for his work in the superintendence of the factories placed under his charge. The syndicates, according to the regulations issued, should not number less than 10 or more than 30 factories; and when a syndicate had subscribed a sum of not less than $150 towards meeting the cost of the services of inspection and instruction, the Department of Agriculture and Colonization for the Province of Quebec agreed to grant a sum equal to the amount which the members of the syndicate had subscribed among themselves, up to the sum of $250 per syndicate.

Certain regulations were framed by the Department, and it was required that these should be conformed to and complied with, in order to entitle the syndicates to receive the Government grant. The main rules for the procedure of each inspector, required that he should visit each factory in the syndicate regularly in such a way that there would be no interval of more than one month between any two visits. It was expected that each factory would be visited at least six times during the course of the manufacturing season. The object of the inspector's work is set forth in the following regulations:—

"The Inspector by his advice and superintendence will do his utmost to obtain from the factories of his syndicate: (*a*) A uniform and good quality of produce; (*b*) scrupulous attention to cleanliness; (*c*) constant attention to the testing of the milk furnished by his patrons; (*d*) a sufficiently good method of keeping records, in order to prove the exactitude and truthfulness of the yearly report of operations, which each factory will furnish to the Department."

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Each factory included in any syndicate, was required to pay an annual subscription for membership in the Dairymen's Association, of the Province of Quebec, or any one of the District Dairymen's Associations. Each syndicate was requested to appoint a President, Vice-President and a Secretary-Treasurer, that through these officials, communications might be carried on with the Department of Agriculture and Colonization.

The following is a copy of the declaration made by the several factories composing a syndicate:

"We, the undersigned, representing the factory of..... hereafter men-
"tioned, declare that we organise as a syndicate according to the programme fur-
"nished us by the Department of Agriculture and Colonization and declare that we
"promise to pay and subscribe towards the requirement of our inspection service a
"total sum of.....to be divided as agreed upon by the manufacturers."

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INSPECTION OF CREAMERIES.

The regulations of the Ontario Creameries' Association for their work of inspection during 1890 were to the effect:—(1) That every creamery in Ontario should be entitled to two visits from the instructor during the season, free; (2) Any creamery might secure his services after these two visits or between them, by paying the Association $5 per day and the travelling expenses of the inspector, that being the net cost to the Association; (3) Every creamery was expected to send to the Treasurer $5 for the annual subscriptions of five members of the Association, who should each be entitled to a report of the annual conventions of the three Dairy Associations of Ontario; (4) Each creamery was expected to co-operate with the Association in the effort to make butter uniform as to quality and style of package, both for home consumption and export; these are essential for us to secure the same enviable reputation for our butter that our cheese has attained.

It seems to me that the butter-making and the butter-making interests of the Dominion are quite as needful of help from travelling instructors as the sister business of cheese-making, and I would suggest to the Provincial Dairy Associations the advisability and the desirability of organising this work of inspection and instruction in still more effective ways upon some uniform plan which may be slightly modified to serve the particular needs of the different districts. A provincial inspector and instructor to supervise the work in each Province would seem to be required, in order to give unity and efficiency to the work in the several districts. Travelling instructors, fitted out with a complete set of utensils for the making of butter, could also be very usefully employed in spending a few days in each of the townships or parishes in the several provinces, demonstrating to the farmers and others who might attend, the best methods of carrying on home or dairy butter-making.

To all these instructors, to the cheese-makers and butter-makers whose factories they visit, to the persons who might attend the butter-making demonstrations in these townships and parishes, we will be glad to furnish from the office of the Dairy Commissioner, Ottawa, bulletins for instruction and reference in all the particulars of these two arts of making butter and cheese.

NOTES FOR THE GUIDANCE OF DAIRY INSPECTORS.

I have put together the following notes for the guidance of dairy inspectors and instructors in visiting factories. The authorities of the several Provincial Associations, District Associations, or syndicates, which control the inspectors, may use them, with or without modification, according to the needs of their own district.

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1. Call at every factory and invite the representative to subscribe to the fund of the Association for the engagement of your services.

2. When you visit a factory, be sure to invite the co-operation of the cheese-maker in the examination and testing of milk.

3. Leave one of the records showing the quality of the milk with the representative at every factory where you test samples.

4. Instruct the cheese-maker as far as possible in the methods of testing milk, that he may be able to apply them successfully in your absence.

5. Advise with the cheese-maker about the ripening of milk and the whole process of manufacturing the cheese.

6. Try to impress upon every maker that a great advantage arises from keeping all parts of the factory and factory utensils perfectly clean.

7. Urge upon the maker, the need for pressing the cheese 20 hours, and highly recommend them to turn every cheese in the hoops in the morning. Condemn the carelessness that leaves projecting shoulders or edges upon the cheese. Encourage neatness and cleanliness.

8. Advise every maker to keep his curing room tidy and well ventilated. The cheese should stand in straight rows upon the shelves, and be so placed that their tops shall look level.

9. You are requested to prosecute any case of adulterated milk, only when requested to do so by the proper factory representative. The half of the fine which comes to the informer is to be remitted by you, for the funds of the Association.

10. Report once a week to....., and mention the P. O. address or addresses that will find you during the following week.

11. You are expected to refrain from giving any expression of opinion or *private* information to any cheese buyer, about the quality of the cheese in the several factories which you may visit.

INSTRUCTORS' REPORTS.

Of the several reports of the travelling instructors, that have been submitted to the respective Associations for the work of the past year, I have selected the following as indicating the nature of the work which should be done :—

COWANSVILLE, QUE., 30th Oct., 1890.

To H. SEWELL FOSTER, ESQ.,

President, District of Bedford Dairymen's Association.

DEAR SIR,—I beg to submit to you my first annual report as cheese-making Instructor and milk Inspector for the District of Bedford Dairymen's Association.

In compliance with the instructions which I received, I visited the cheese factories in the counties of Shefford, Missisquoi, and Brome, which agreed to contribute to the funds of the Association, as far and as often as time would permit.

The object I had in view when I visited the factories was to assist the cheese-makers to turn out the finest quality of cheese, uniform in make, neat in appearance and with good keeping properties.

My mode of procedure was to examine the condition and test the quality of the milk which the patrons supplied, in order to advise the cheese-maker and patrons,

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how pure, clean milk of honest quality and in good condition could be provided; then, by examination of the cheese, conversation with the cheese-maker and careful observation of the factory, its equipment, utensils and surroundings, I tried to discover the cause of any defects in the cheese; then by advice, by practical illustration, and general instruction, I endeavoured to help the cheese-maker to so change and improve on his practices as to remedy the defects and to remove the causes for the same.

As suggested to me by the Dairy Commissioner at Ottawa—Prof. Robertson—I filled up a report on the particular condition in which I found every factory, its utensils and also its cheese. These I sent to you weekly during the season; and I will now supplement the information which they contained by a summary of the season's work and a few general conclusions which I have reached from the season's experience.

I had on my list 30 cheese factories. These were supported and patronized by 750 farmers.

I made cheese and instructed the makers on 130 days; I also made 42 short visits and gave instructions.

I made 3,030 examinations of milk by the use of the lactometer, pioscope, and cream tubes. I also made 2,020 tests of milk by the lactoscope.

I wrote 205 letters to patrons of the factories in regard to milk of doubtful quality, which had been furnished in their cans. I found 125 cases of milk which had been adulterated or tampered with by the removal of cream or the keeping back of strippings. Of these, 25 of the worst cases were settled to the satisfaction of the committees of the factories to which the defaulters belonged; most of the others were let off with a warning against a continuance of the wrong practice.

I attended six meetings in the evenings, to discuss with patrons the best way to take care of milk and prepare it for cheese-making.

In the course of my work, I travelled about 1,000 miles and frequently was occupied from four o'clock in the morning until eight at night.

I observed an improvement in the condition of the factories or in the quality of the cheese in all except three cases.

By the farmers and cheese-makers, I have been treated with kindness and fairness in nearly every case, although at first the work was rather discouraging, because of the indifference of some of the cheese-makers and the opposition of a few of the cheese buyers.

I learned that many farmers paid no attention to the straining of the milk, or to the aërating of it by dipping, pouring or stirring, or by the use of a suitable aërator. In many instances, also, no regard was had to keeping the milk in a place where the air was free from bad smells. Too little heed was paid to cows in the matters of pure water and wholesome food. Sometimes they were allowed to drink filthy, stagnant water, because they could not obtain anything else.

Then, I think the milk in the Bedford District is richer in fat than the average milk in Ontario, and the method of cheese making has to be slightly modified to yield the best results. I think the milk should be set in a rather sweeter condition, the curd should be cut a little finer, the curd while in the whey should be stirred continuously after it is cut, the temperature should be raised a little higher—(say to 99 or 100 degrees in summer and to 100 or 102 in the fall):—the curd should also be stirred very thoroughly, and carefully after the whey has been removed.

I found the curd and the cheese a shade whiter or more of a chalk colour than they are in Ontario; but the cheese are not so liable to be porous. The moisture appears to be more difficult to expel; consequently, I have recommended the foregoing treatments.

Many of the makers by adopting my suggestions seemed to make marked improvement, so did also the patrons by following the instructions in the Bulletins, which were distributed from the office of the Dairy Commissioner.

In many cases, there was also a decided improvement in the appearance of the factories and the cleanliness and neatness of the utensils and apparatus in use.



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Some factories were turning out cheese just as fine as the best from Ontario, and what a few factories have done, I believe all can do, if the patrons and makers will do their best. I regret, however, to say that in some cases as yet not much effort has been made to excel.

The work is only beginning to show its results, and honest farmers are perceiving the benefit of keeping any who may be dishonestly disposed, from getting or taking an unfair advantage over their neighbors, by tampering with the milk which is supplied.

I think a large number of factories will seek to avail themselves of the benefits of instruction and inspection next season. It has been told to me that some makers have gone to the factories where I have been giving instructions to get the pointers second hand; and I think they will come out manfully and fairly next season and pay their share of the expense.

I cannot speak too gratefully of the help and encouragement I have received from the officers of the Association. They did everything that could be done to aid me in my work. The President, Mr. H. S. Foster, was particularly kind; and I think he is doing for the farmers of the Eastern Townships a work similar in worthiness and importance to that which Mr. Thomas Ballantyne of Stratford did for the farmers of Western Ontario at the commencement of the cheese business there, namely, giving them the opportunity for instruction and encouragement to make a success of it.

On the whole, I consider the progress of the past season has been fairly satisfactory; and the work of instruction and inspection should be kept pushing on until the greatest possible improvement has been accomplished and the cheese from the Eastern Townships stands second to none in Canada.

All of which is respectfully submitted.

(Signed)

ROBERT WHERRY.

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The reports of the other inspectors in Ontario and Quebec will mainly be found in the printed reports of the proceedings of the several Associations, under whose auspices they were employed.

The following sheet is a form which can bo used with advantage for the report by the inspector of each visit he pays to every factory on his list :—

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REPORT ON.....FACTORY.

.....189

Cheesemaker's name.....

P. O.....

Representative's Name.....

P. O.....County.....

Number of Samples of Milk found unsatisfactory.....

Number of cases investigated by me.....

Number of cases recommended for prosecution.....

Number of cases where patron has been visited or written to.....

I found factory drainage.....

I recommended.....

Factory building.....

I recommended.....

.....

Condition of vats, sinks, curd cutter, weighing can, conductor, strainer, thermometers and small utensils.....

.....

.....

I recommended.....

.....

I found the practice and system of the Cheesemaker.....

.....

I recommended.....

.....

REPORT ON CHEESE.

Make per day.....Coloured.....White.....

Make per day at last visit.....; on..... ... of.....189...

Flavour.....

Body.....

Texture .....

Colour.....

Appearance.....

REMARKS:—.....

.....

.....

.....*Inspector.*

6*d*—4½

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## IV.—SECOND VISIT TO LECTURE IN THE MARITIME PROVINCES.

On the 24th of June I left Quebec by the S.S. "Union," accompanied by Mr. J. C. Chapais, Assistant Dairy Commissioner. The object of the visit was, first to give instruction in the practical part of cheese making to those who had charge of factories in the Saguenay district of Quebec, and afterwards to address gatherings of farmers in New Brunswick, Nova Scotia and Prince Edward Island on dairy farming and kindred branches of agriculture.

To make the account more readable and more serviceable to those who may be seeking information from it, about the nature of the farming carried on in these provinces, and their adaptation for mixed farming with a larger development of animal husbandry, I will put it in the narrative form, as condensed from notes which were made daily during the journey.

### DOWN THE ST. LAWRENCE.

Below Quebec the noble old St. Lawrence has acquired a demeanor of tameness quite in keeping with his responsibilities in carrying the commerce of Canada to and from the nations of the Old World. The boisterous and turbulent behaviour of his early course has been changed to the even flow of old age. Still, enough of ripples and rapid movement near its edges, indicate that the water is yet in sympathy with all the frolicsome conduct of its early career.

Cape Tourmente is grand and somewhat awesome looking. Doubtless its solemn severity of countenance was what provoked the Indians to blame it for starting all the disastrous storms that blew from behind its shoulders.

The Bay of St. Paul is a quiet looking cove with an island pier quite a mile from the firm ground of its shore. The unstable ground in the shape of mud, extends quite half that distance. Murray Bay is a peaceful place, surrounded by soil light and sandy in its character, more adapted for recreation and pleasure than for profitable agriculture.

### UP THE SAGUENAY.

The scenery up the Saguenay is unique and weirdly beautiful. The bed of the river doubtless had its origin in some volcanic tumult of bygone ages. Its seal brown waters glide along in a most insidious way, and in parts they seem to gurgle without making any noise. Here and there the banks are faced with a rugged and bare escarpment of rock. At other places the mountains on both sides are finished and rounded into a smooth and quiet self-possession, which has not been startled of recent years by many of the strange changes which modern civilization and industrial development have effected elsewhere in Canada. Between the hillsides, cosy farms appear to have been tucked in, as though blown there off the bare steep faces of other cliffs, when the hurricanes of water and wind were busy making the surface of farms for the after-sustenance of human inhabitants. The tide makes its influence felt for fifteen miles above Chicoutimi. At Chicoutimi we first caught a glimpse of the wild tumbling falls of the Rivière du Moulin, as we wended our way over the hillside to examine the adaptation of the country for grazing and supporting cattle. The district seemed to be admirably suited for keeping stock in the best of health. Though the season is somewhat short, the growth is rapid, and mixed and dairy farming could be developed with advantage in that locality. Chicoutimi is but a lumbering town, in regard to its industrial enterprises. A large cathedral occupies a prominent site; it with the Bishop's palace, a convent, a college, and a hospital make an imposing group of buildings on the brow and site of the hill opposite the pier. The inside of the cathedral is still unfinished, and the coarse dull plaster looks timidly conscious of too much exposure.

### DAIRYING IN CHICOUTIMI.

At Ha Ha Bay, which seems more like the main stream than an arm of the river, we stayed off for three days. One object of our stay there was to visit the

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creamery of Mr. Couture, M. P. at Laterriere. The business basis upon which the creamery is conducted, is of the nature that the proprietor gets 20 per cent. of the price for which the butter is sold, in consideration of his manufacturing the butter and providing all the appliances which are required. The patrons deliver the milk at the creamery and receive back on the average 90 pounds of skim milk per 100 pounds of whole milk delivered. The milch cows in the neighbourhood are partly of the Quebec Jerseys and partly of the Ayrshire breed. As a typical instance, I saw the herd of one farmer who had 7 Quebec cows yielding an average of 22 pounds of milk each per day. That was counted in the neighborhood to be very good. The barns of the farmers are neatly whitewashed and kept very tidy in their outward appearance.

At St. Alphonse, Ha Ha Bay a day was spent in the cheese factory, giving instruction and practical demonstration in the art of making cheese to cheese makers from the surrounding district who had assembled to the number of twenty. A meeting was held at both Laterriere and St. Alphonse, when Mr. Chapais gave some useful instruction in the economical methods of feeding and caring for cattle.

### COAST OF BONAVENTURE AND GASPÉ.

From Ha Ha Bay the journey was made by way of Rivière-du-Loup and the Intercolonial Railway to Dalhousie. From Dalhousie by the steamer "Admiral," I went up to Gaspé Bay. The coast is settled back for a distance of about a mile. At a few places, which have grown to be commercial centres for receiving the farmers' produce and distributing to them goods which they require, the settlement extends three or four times that distance from the shore. The people are mainly in their origin from Jersey, the North of Ireland, and Scotland. Petroleum has been found, and a vein of lead near Gaspé is said to be over a foot thick. Salmon are caught in large numbers during the summer season, are packed whole in boxes into which snow has been pounded, and thus encased are shipped direct to the markets. The main farm products from the coast, take the form of oats and butter.

A large number of Bulletins of instruction have been sent into the neighborhood since. A more general development of cattle keeping and butter making would enable the settlers to realise much more from their farms by the shipment of dairy products, which can be carried to market with the smallest proportion of their own value being absorbed in transportation charges.

### MEETINGS IN NEW BRUNSWICK.

*Sussex in New Brunswick* was the next point visited. Two meetings were held, which were not very largely attended. In the village there is a cheese factory doing a small business and turning out a creditable quality of goods. The fertile valleys and beautiful hills that alternate with each other in that part of New Brunswick, make a rare combination of grand scenery and productive farms. Much larger numbers of cattle could be kept to advantage in that well watered district, and by their earning power they would offer inducements for the farmers and other dwellers, to stay there and develop the resources of their own province.

From Sussex the route to *Gagetown* on the St. John River was followed by way of the Canadian Pacific Railway to St. John City, and the S.S. "May Queen" up the river. *Gagetown* as a village is a veritable "sleepy slope." It lies straggled for half a mile or more along the Gagetown Creek. Its aspirations after greatness were altogether discouraged when the route of regular travel to St. John City was changed from the river to the railroad, some 20 miles distant. Some excellent cattle are kept in the neighborhood, but dairying upon the co-operative method must beintroduced to enable the farmers to prosecute that branch of the business with profit.

The semi-annual meeting of the Provincial Farmers' Association of New Brunswick, at *Woodstock*, was the next destination. On the way thither by way of the New Brunswick Railway, out of Fredericton, a boom containing not less than

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twenty-three millions of feet of logs was passed. If the parts of New Brunswick are ill-adapted for the yielding of large crops in respect to the husbandman's toil, they do yield a harvest,—not less valuable to the workers there—in the form of logs and lumber. The resources of the Dominion are so varied and different, that only those who know it well in more than one aspect of its greatness, will do justice in judgment to its several sections. Farmers who have been accustomed to the comparatively level and rich fields in the garden of Ontario, speak with disparagement of the rough and wilderness-looking regions of New Brunswick; but when one sees the magnificent crops of timber which are harvested from its hill-sides, he is convinced that though the crop be widely different in nature, it is not of any less value per square mile. Around *Woodstock* the country grows excellent crops of hay, and a correspondence with some experienced cheese manufacturers in the Province of Quebec since my return, has resulted in their planning to visit that neighbourhood and endeavour to start co-operative dairying with cheese factories or creameries.

### MEETINGS IN NOVA SCOTIA.

From Woodstock by way of St. John, a crossing was made to the far-famed *Annapolis* valley. The Bay of Fundy, which has been berated by those who begrudge St. John its prosperity as a sea port, was very smooth and quiet. Meetings in the Annapolis valley were held at *Bridgetown*, *Middleton*, and *Kentville*. The farmers in the valley have gone into fruit growing on a large scale. Success in that enterprise has followed their efforts, and I do not think that co-operative dairying would make much headway in that region; though the dissemination of instruction on the best methods of carrying on home butter-making would be appreciated by the people and would bear good fruit.

*Amherst*, N. S., was the next place for which a meeting had been appointed. The dyke lands afford such excellent crops of grass for pasturing and hay, that large numbers of cattle are kept in the neighbourhood. However, I learned by enquiry that the number of cattle is now considerably less than it was twelve or fifteen years ago. The quality also was said by the farmers in the locality, to have deteriorated. Too much attention has been given to the cutting and selling of hay and too little to the feeding of stock whereby the uplands of the farms could be kept in better heart for crop growing.

The branch *Experimental Farm* for the Maritime Provinces, at *Nappan*, is about seven miles distant from Amherst. A day was spent in company with the Superintendent, Col. Blair, in going over it.

From *Nappan* the journey was taken to *Truro*, where there is a large and well managed condensed milk factory. An examination of the quality of its product has been made since my return to Ottawa. It has also been compared with the quality of the condensed milk such as is sold in large quantities in England, and my opinion is that the product of the Truro establishment is quite equal to the best that I have obtained from England, and is superior to very many of those brands.

The *Antigonish valley*, where Mr. L. C. Archibald conducts several cheese factories, was the next district visited. In the town of *Antigonish* two large meetings were held; and the farmers in that neighbourhood appear to be well satisfied with the results of their past three years' experience in supporting cheese factories. A local committee had been appointed to make all the preliminary arrangements for the meetings, and they had advertised a pic-nic for Lochaber, some 20 miles distant. The pic-nic was held upon a small island on that beautiful inland sheet of water. Enough interest had been taken by those in the vicinity to cause them to erect a bridge for the occasion. Many of the farmers with their families were in attendance; and addresses upon agricultural topics were made by Mr. Justice Lynch, of Quebec; Mr. H. S. Foster, of Knowlton; Col. Ora P. Patten, of Montreal; and the Dairy Commissioner. It is expected that several new factories will be started in the Antigonish valley and the surrounding portions of Nova Scotia during the current year.

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From Antigonish I passed over to *Cape Breton*. Meetings were held at *Mabou* and at a temperance hall a few miles distant. The well watered valleys and rich hillsides of *Inverness County* point it out as a section well adapted for profitable dairy enterprises. A few features of life,—or the want of it,—in that neighbourhood, struck me as being peculiar. The brackets which had been used for the shingling of barns and dwelling houses twenty years ago, are still left undisturbed on the roofs. Whether they are left for ornamental or useful purposes I was unable to discover. The leaving of things not quite well done, is a weakness on the part of the people, which has induced them to belittle the country in which their lot has been cast. The lack of energy wisely directed, on the part of those whose right and privilege it is to make the most of their own inheritance, is the cause of the backward condition of agriculture in Cape Breton, rather than any inherent drawback in soil or climate or even marketing facility.

### PRINCE EDWARD ISLAND.

From Cape Breton I went by way of Point du Chene to *Prince Edward Island*, that gem of our Provinces on the Atlantic coast. The beautiful green of its fields and trees, the bright red of its soil, and the deep blue of its many bays, give it a landscape wonderfully pleasant in its insular beauty. Meetings were held at *Kensington*, *Eldon*, *New Perth*, *St. Peter's*, *Tignish* and *Charlottetown*. The agricultural capabilities of the Island are very great. It has a much smaller percentage of waste land than any of the other provinces. Cheese factories were started in several sections twelve or fourteen years ago. As a consequence of some unexplained misfortunes in management, the business has been abandoned almost entirely. During the course of my meetings I took occasion to mention that if young men from the Province would apply to me for situations in cheese factories in Ontario, I would be very glad to do what I could, to have them placed in factories where they would be instructed in the very best methods, in order that they might return to their own neighbourhoods and re-establish the dairy business upon a firm and secure basis. I have received several applications from young men with that object in view.

## V.—MANITOBA, THE NORTH-WEST TERRITORIES AND BRITISH COLUMBIA.

A trip through the western provinces of Canada had been arranged, in order to create a greater interest in dairy farming in that part of the Dominion, and a the same time to learn from personal observation and inquiry how the work of this office could be shapen and directed so as to render the best of service to the citizens of Manitoba, the North-West Territories, and British Columbia. The following report of an address which I delivered at Shoal Lake, Man., on 21st August, 1890, sets forth the object of my journeyings and also the nature of the subjects which were discussed at the meetings of farmers. Its introduction here will save a repitition in some measure.

## AN ADDRESS AT SHOAL LAKE, MANITOBA.

*August* 21*st* 1890.

Mr. Chairman, Ladies and Gentlemen,—

I count myself happy in being able to visit and travel through the Province of Manitoba at this season of the year, when its fields are rich in aspect and in reality with the magnificent crop now being harvested. Perhaps nowhere else in all the world could there be seen in the beauty of excellence and uniformity such vast areas

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of waving, ripening, ripened and partially reaped wheat as are to be found this year in this Western and the other North-Western Provinces of Canada. I was well aware before leaving Ottawa, in fact before the plans and programme for this trip through Manitoba and the North-West Territories were arranged, that the present would be an unsuitable time of the year in which to visit this part of the Dominion, if the main object of my visit were to address large audiences of farmers. The urgency of harvest work demands the whole time of most farmers at this season. I well understand that from daylight to dark the click of the self-binder is to be heard, and that public meetings or addresses are not accounted by the farmers as either luxuries or necessities during the continuance of harvest work. Still, I am glad to have the opportunity of meeting with a number of the farmers at the places I visit, to discuss with them some aspects of mixed and dairy farming and the adapation of Manitoba to such a sort of agriculture. The purpose of my visit is more to learn the conditions and possibilities of farming in the west than at present to teach anything new in either system or practice. I am more eager to observe than to advise, and more anxious to gain information than to express opinions.

### WORK OF THE DAIRY COMMISSIONER.

My instructions, from the Hon. John Carling, Minister of Agriculture for the Dominion, are to the effect that I should make the office and work of the Dairy Commissioner as practically useful and helpful to the farmers in all parts of the Dominion as possible. With that object in view he suggested to me the advisability of seeing Manitoba and the North-West for myself, in order that after discussing the situation, the adaptations and resources of the country, with as many of the leading farmers as I could meet, I might try to assist them in the development of the dairy industry in connection with the breeding, feeding and keeping of larger numbers of cattle and other live stock. The holding and addressing of meetings, the distribution of literature, and experimental investigation will be continued with that end in view. Of the good and far-reaching work that is being carried on, on the Dominion Experimental Farms, under the direction of Prof. Wm. Saunders, I will speak briefly later on. It is my good fortune to be associated with him at the Central Experimental Farm at Ottawa, and by every one who knows him, Prof. Saunders, the Director of the Dominion Experimental Farms, is recognised as a gentleman of unique ability, devotedly and successfully laboring to improve the condition of farming and farmers in Canada, by means of scientific investigations, the origination of new varieties of cereals roots and fruits, the distribution of approved new varieties of seeds, seed testing and other branches of the work which he directs. I had the pleasure of his company through the southern part of Manitoba, where we drove some 150 miles, besides the journeying undertaken by railway. When I return to the eastern part of the Dominion I will be furnished with such a knowledge of this country as will enable me to answer the enquiries of some young farmers and others who are bound to come or "go west," even if they have in some respects a good land where they presently reside. Incidentally I may be able to serve you and the Dominion by directing the attention of those who, from one cause or another, desire to change their place of residence from the staid-going east to the inviting opportunities and undefined resources of Manitoba and the North-West. Some farmers and their sons in eastern Canada, from not knowing the true condition of soil, climate and farming in our own West, are induced to go to the States, probably afterwards to lament the haste which led them to accept, without further inquiry, the extravagant statements of railway-lands advertising-circulars and agents from the other side.

### MISLEADING RUMORS.

The reports—the current conversational talk of Manitoba that one hears about it in the east, and also in the old country and northern Europe—do it scant justice, though they exaggerate in some respects with a good deal of recklessness. The waving prairie grass, six feet or more high, I find to be like Jack the Giant Killer's

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bean stalk, a myth of fiction. With the exception of the sedge grass by the river bottoms or in wet places, I have not observed grass growing wild, more than an average of two-thirds the height ot common timothy hay. Of course odd stalks of pony grass and other species stand taller, but the average grass-growth on the prairie does not wave like a jungle or a young forest. The surface aspect of the country is more pleasing than I had expected to find it; and I have seen but little of that tiresome sameness of prairie level, about which too much has been written and said. To me there has been a pleasant landscape of undulating contour, with clumps of woods or bushes always in view. Its appearance makes one think that it had been smoothed like the pasture fields and cropped lands of England, by centuries of good tillage, and had been left with its face but slightly changed during all those ages, when it was the home of only the buffalo and the Indian. "The noble Red Man of the West" is pretty, much another myth of a writer of fiction. He seems to be improving in some respects, and the noblest types I saw, as well as the most nobly occupied, were those who were "stooking" grain at a dollar a day.

### THE SOIL AND SETTLERS.

The soil seems to be generally fertile, though it varies in quality and nature in different localities. To the foot on the harvest fields, it has a peculiar spongy or cushioney quality, which I suppose is due to its large proportion of decayed vegetable matter. Its capabilities for grain-growing are unquestionably great, but too much has been said in praise of that feature, to the neglect of its adaptations for growing feed for cattle in profitable abundance. The reputation of Manitoba for its excellent, its superior wheat, has, I think, told against the Province, instead of in its favor. The wheat-growing of Manitoba has been "cracked up" so much, that many people have been led to believe that it is good for nothing else. People who purpose to emigrate from northern Europe generally prefer to go to a place where they can fall into lines and branches of agriculture somewhat similar to those to which they have been accustomed. They ordinarily have a fondness for keeping cattle and following mixed farming. Admirably do they succeed in that in many parts of Manitoba. I was greatly pleased when visiting the Icelandic settlement, south of Glenboro', in company with Prof. Saunders and Mr. Fredericksen, to observe the well-fed thrifty cattle which were kept by the farmers there. One buyer picked up some 70 head of steers, from two to three years old, in two days' buying. They have a cheese factory turning out some 300 pounds of cheese per day, and while they have the prospect of excellent crops of wheat this year, they are fortifying their position by multiplying their sources of revenue.

### WATER SUPPLY.

In most districts there is evidently an abundant supply of water for house use and the keeping of stock. The rainfall this year has been heavier than usual, but the digging of wells and the building of cisterns to store the rains from roofs, etc., may provide an adequate supply everywhere all the time. Of that feature of climatic condition I can speak only from the opinions which others have expressed.

### THE CLIMATE.

The activity and energy displayed by the people everywhere are satisfactory evidences of the healthful climate that is enjoyed during the winter, as well as in the summer. The reported abundance of ozone may account for the intensified and amplified mode of expression and ways of speaking about things that obtain up here, to the surprise and amusement of the new-comers. As a typical one let me repeat: "It is cold up here in the winter, mighty cold, the thermometer goes away down to 40 below zero; but then you don't feel it, no sir! you don't feel it at all." Well, I hope I won't, although I intend to come back to Manitoba sometime to meet the farmers during the winter, when they have leisure.

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The place that has been the home of countless herds of buffalo, cannot fail to support thousands and thousands of cattle in health and comfort. Canada is especially the country for rearing and feeding the best quality of cattle for the great centres of consumers who live in countries whose mainstays are manufacturing and mining rather than agriculture. Cattle here are remarkably free from disease, and the climate promotes the development of vigorous constitutions. Cereals reach their best as they near the northern limit within which they can be ripened to advantage. The same may be predicated of cattle when good management prevails.

The sun is the master-workman on the farm; he does all the work, and the man's business is to do the chores. Did you ever think of the sun's power in agriculture? There are men who never think of the virtue or value of sunshine in farming operations. The sun is doing the work of changing the dead plant-food into the structure and substance of the living plant. When the sun shines on a man's field, he is seeking something to roll himself into, that he may leave his own strength there for the service of man hereafter; and if a man leaves no substance in his field into which the sun can roll and store himself, the sun leaves nothing behind him. He has shone there all day long, and that man is so much the poorer by having lost a whole day's work of the sun which he might have had to sell afterward. I wind a watch. I thus wind my own strength into the spring in a half minute or less. My strength remains there to move the hands of the watch all day long. But if there be no spring in the watch, I can leave no power there. I can transfer none of my energy to the watch, unless there be a spring or other device into which I can accumulate my strength. But if there be a good spring, the spring stores my strength for a day or a week or a year. It can be expended to drive the mechanism of the watch steadily at any time. The spring in my watch is merely what the plant food is in the soil. The spring is a contrivance into which I store my own strength; the plant-food is a convenience into which the sun can store his strength and his energy. And then, when a horse eats a bundle of hay he is merely transferring into horse power, the power which the sun rolled into that peculiar plant-spring. In that way the sun is doing all the work of the world. A long time ago the sun was shining down on the earth hotly, vigorously, and continuously. He was rolling himself up year by year and century by century into plants—plants that stored his strength with avidity. Then there came great changes in nature; and those great trees and other plants, full of the sun's energy, were buried away down deep in the bowels of the earth, but still they held the strength of the sun mysteriously stored in their structure. Now men open mines, they dig up concrete sunshine and energy in the form of coal, they fill the furnaces, they apply the magic-liberator fire, and as the mighty engine moves, wheels are turned to-day by the energy which the sun wound up in the vegetable kingdom on the earth ages and ages ago. But to go back to the watch illustration used a moment ago, if the chain between the mechanism of my watch and the spring-drum be weak at one end, I will be better served by a shorter chain of sufficient strength throughout, even if I am thereby required to wind it up oftener. The growing season in Manitoba and the North-West is apt to bring with it a wheat-damaging frost before the late grain has ripened. It will be better for the farmers to sow the earlier ripening varieties than run too much risk of the weak link or two in the weather, when the common variety is hardly ripe.

### EVIDENCE OF PROGRESS.

The enterprise and push of the people of the west have become proverbial. A little of the cautious slowness of older communities would not be a weakening element or a useless brake on the progress of these newer settlements. There may be a recklessness that is not safe enterprise and a desire to engage in big things that often leads to loss, if not disaster. When a man hastens to break up all his holding to get in an immense acreage of wheat, he is playing for big stakes or aiming for enormous profits; but the man who keeps gradually and constantly multiplying the means and sources of his revenue, is the man who has ensured lasting success. If a

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dry season should come or an early frost blight the wheat, the speculative farmer has only words of blame and disparagement for the country, whereas the man who has not put all his chances on one crop or product, will do fairly well every year.

The substantial buildings which I have seen completed or in course of erection in cities, towns, villages and country, convince me that the people of Manitoba themselves have faith in the future of their Province and in the increasing prosperity of the Dominion of Canada. The public buildings of Winnipeg are a credit to the metropolis of the West. Brandon seems to have been struck by a building boom, in the wake of the example and impetus given by the erection of a splendid new Post Office building there. The commodious and fine-looking structures which accommodate the educational institutions and activities of Portage-la-Prairie, are a credit to the people of the place and the Province. As the glory and strength of a nation truly inhere in and rise from its educational institutions, Manitoba is not neglecting this important interest. School houses, commodious and even elegant in design and finish, are not so much more costly than they are in the East, as I had expected to find them. A plain neat comfortable-looking school of four rooms, with internal equipment equal to the needs of teachers and pupils in these days of modern appliances and aids, had been erected lately at Manitou, at a total cost, I understand, of $2,900. At the same place a prosperous cheese factory, receiving about 3,000 pounds of milk per day, is helping to carry on the education of the farmers into keeping more cows and stock of all kinds. The risk and uncertainty always incident to exclusive grain growing may thus be eliminated from the farming of the people of this Province.

That Manitoba should have a cultivated acreage of about one million of acres is a tribute to the industry of its farmers. The unequalled quality of wheat that has been marketed in past years has won the western part of Canada a primacy of reputation in the production of that cereal.

### LIVE STOCK.

The numbers of excellent horses that have been imported into the Province have provided good foundation stock from which to breed horses for provincial uses and later on for export. The large number of young colts seen in paddocks and yards adjoining the houses in the country prove that this branch of stock is not being neglected. The proportion of poor inferior horses to the number of good ones, is less than in any of the other provinces where I have travelled. The same is true of cattle, from the stand-point of looks in both cases. Evidently the knowledge that the freight-charge on an inferior horse and cow would be just as high as on an animal of superior merit, induced those who brought them in to select the best they could find.

### MIXED FARMING.

With cattle of such excellent quality, I think, the farmers here would be safe in going more extensively into mixed farming, or into stock-keeping and dairying. That system of agriculture has many advantages over exclusive grain-growing. I will make a few observations on the gains which, I think, would accrue to the people of Manitoba from going more and more into it. The primary object of farming is to find food for the people ; but a three-fold line of endeavour characterises all skilful agriculture. It is needful to provide food by farming, but it is also necessary to maintain the fertility of the soil and give occupation at remunerative rates to as large a population on the farms as possible.

### FOOD FROM THE FARM.

Under the first head—that of finding food—I will say but a few words. When a farmer grows a crop of wheat, he provides for the bread of the people, and in exchange for what he has to dispose of, he gets the other comforts and necessaries of life which he desires. But the life-sustaining value of the wheat does not all reside

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in the flour. When a milking cow eats the bran, the chaff and even the wheat straw, he can procure from these by-products, butter for his bread. Then many crops can be conveniently grown upon land, which can be marketed to most advantage in the form of animals and their products. The prairie grass, so plentiful yet in parts of the country, can thus be turned to food account. Then the surplus farm products of Manitoba must, for many years to come, find their market in distant places. The expense incident to the carrying of a tub of butter or a box of cheese from here to Liverpool is not much greater, than the expense of transporting a bushel of wheat. The former would bring from ten to five times as much value to the farmer as the latter. Happily, the admirable and efficient transportation facilities, afforded by the Canadian Pacific Railway, put Manitoba on a favorable footing with competing countries in her marketing conveniences.

### MAINTAINING FERTILITY.

Some men may be disposed to pooh-pooh my advice, when I say that the farmers of Manitoba ought to give heed to their way of farming lest they exhaust even the bountiful store of fertility which nature has left in their soil. It is an incredibly large bank account which cannot in time be exhausted by the repeated and frequent "chequing" of a prodigal who never makes a deposit. Meanwhile many fields begin to evidence the need of a dressing of barn-yard manure, and when they receive it, give a profitable account of the treatment. At a meeting in Portage la Prairie the other evening, Mr. Glennie, from the Portage Plains, which are not reported to be the least fertile of all the lands in Manitoba, said he had put a heavy dressing of barn-yard manure on one of his fields last winter. He is a careful, observant man, a farmer with practical experience in Ontario, and is doing well on his farm. He said that the wheat on that field ripened some eight days earlier than the other wheat on his farm. All risk of damage by frost was avoided and a heavier and better crop was harvested. It will pay the farmers of Manitoba to begin in good time to conserve the wonderfully productive power of their land, by keeping large numbers of stock and putting back upon the fields the barn-yard manure. As it is better in old age to have a character and constitution that have not been wrecked or wasted by the dissipations of early folly and vice, so is it better in maturer years of a country's agriculture to have soil that has never been "broken-hearted" by continuous grain-growing and grain-selling, than to have it robbed of its elements of fertility without any effort at restoration.

### WORK FOR A LARGE POPULATION.

Then the number of workers who can be employed with advantage on a farm, where exclusive grain-growing prevails, is small, compared with those who may find remunerative occupation at mixed and dairy farming Population is the main element that gives value to property. A section of land where the population is sparse has but little value compared with an acre or two in the centre of Toronto or Montreal where the population is dense. The kind of farming that occupies the largest population at paying wages, is the best for the whole country. Of course a people or a country cannot successfully contend against their natural adaptations. But I think these for Manitoba, in the main, are mixed farming with special attention to dairying, horse-breeding, and sheep husbandry. When cattle are more numerously kept, employment can be given to the farm-hands the year round. The men must eat for twelve months, even if they obtain employment for only six. Thus the expense and income of the average farm would be equalised over the whole year with more certainty of profit.

### WINTER FEED FOR CATTLE.

I am not ignorant of the fact that there are difficulties in the way of successful dairying and stock keeping in Manitoba. But they are not insuperable. The finding of suitable and cheap winter feed has appeared like an insurmountable obstacle.

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When the crop of wild hay has not been abundant, feed has been scarce. However, a mixed crop obtained by sowing oats, barley, pease or vetches together, will provide suitable fodder, and that too quite cheap. On the Brandon Experimental Farm there were grown, Superintendent Bedford informs me, four tons of such a mixed crop to the acre. I dare say every ton of it has an equal or greater feeding value than a ton of well-cured hay. Again, Hungarian grass and millets grow luxuriantly here. A few varieties of fodder corn grow to a stage of maturity at the best for ensilage. By and by, many of the native grasses may be cultivated with advantage, when they have been sufficiently tested and a supply of seed has been collected. When I speak of the work of the Experimental Farms, I will mention what is being done in that matter.

### DAIRY PRODUCTS.

The cool nights of summer and the cold weather of winter are both favourable to the production of excellent butter and cheese. Some years ago, when the Ontario Provincial Exhibition was held in the City of Ottawa, I had the pleasure and satisfaction, as one of the judges on butter, of awarding to butter from Manitoba, first prize, because of its superior excellence. That co-operative dairying can be successfully carried on, needs no argumentative demonstration here in Shoal Lake, where you have a creamery with an average turn out, so far this season, of 475 pounds of excellent butter daily. Its enterprising proprietor, Mr. Scott, is even preparing to can some butter for the foreign markets to the far west of you. The enterprise of the Canadian Pacific Railway Company, which is giving us the Pacific Ocean steamship service, promises to enable us to capture new and valuable markets in China, Japan, etc.

Then the Manitoba Dairymen's Association is an organisation which may render the Province very valuable service indeed. We are fortunate in having here to-night Mr. Wagner, who is an ex-president and the veritable and venerable father of the Association. Its existence and usefulness are of far more consequence to the Province than many more-pretentiously named organisations. The Dairymen's Associations of Ontario have done great things for that premier province, and the opportunities and needs for the work of a similar association up here are no less great and urgent. The benefactors of the people often work in unostentatious ways.

### DOMINION EXPERIMENTAL FARMS.

I now desire to speak a short time on the work of the Experimental Farms which have been established under the Dominion Government, to promote the agriculture of every part of Canada. A few years ago the Minister of Agriculture, the Hon. Mr. Carling, planned the system of Dominion Experimental Farms. Their establishment marks an era of increased interest in intelligent and skilful farming in Canada. Their work in the main is to do for the farmers of the Dominion what they could not singly and by private means do for themselves. Prof. Wm. Saunders is the Director, and those who know him best are best aware of the eager and pains-taking devotion with which he has applied his remarkable abilities to their establishment and the making of their work practically and, as far as possible, immediately useful to the farmers of the several provinces of our vast Dominion.

The Central Experimental Farm is situated near Ottawa. The varied climatic and other conditions, which prevail in different parts of Canada within her width of 3,500 miles, necessitated the selection of branch farms. The farm for the Maritime provinces is near Nappan, in Nova Scotia, within a few miles of the borders of New Brunswick. The Manitoba Farm is within a mile of Brandon in your Province. At Indian Head a section has been secured to specially serve the interests of the farmers of the North-West Territories; and British Columbia may look for information and guidance to the one at Agassiz, B.C.

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### CENTRAL EXPERIMENTAL FARM.

At the Central Experimental Farm, Ottawa, there is an experienced staff of scientists and practical men. It may interest you to learn of a few of the features of the work which is now being carried on. In the division of agriculture proper, there are being grown under test over 300 varieties of cereals, over 200 varieties of potatoes, and all the common and many other varieties of turnips, carrots, mangels, etc. One series of six ranges of six plots each, is used for investigating the effects of early and late sowing. On the first range, wheat, barley and oats, on separate plots, are sown as early as the land can be worked upon. One week later the next range is sown with the same sorts of grain, and so on until the sixth range is sown. Another range of plots provides for testing the effects of thin *versus* thick seeding. Provision has also been made for testing the effect of cutting the different grains at different stages of growth or maturity. Five breeds of cattle are kept. The feed of each animal is weighed and an exact record of the yield or gain in weight is recorded. The comparative value of ensilage and other feeds will be fully tested; and results made known. This year a dairy building and large piggery are being erected. As soon as they are completed, investigations into the most economical methods for the production and handling of milk, butter, cheese, etc., will be undertaken.

Then, under the care of Mr. Fletcher, who is Botanist and Entomologist, investigations are being carried on to discover the comparative values of some 100 grasses, —many of them native to your own country and not before brought under cultivation. A few of them, especially those from Manitoba and the North-West, promise to render excellent service for the seeding down of meadows, where the commonly cultivated grasses, like timothy and meadow fescue, will not stand the winter. Mr. Craig, the Horticulturist, has over 200 varieties of Russian apple trees growng, from which it is hoped a few may be obtained that will do well in Manitoba and the North-West, and thus permit of the cultivation ot the larger as well as the smaller fruits up here. Then Mr. Shutt, who is Chief Chemist of the Station, carries on analytical investigations in soils, plants, fertilisers, animal products, etc. In the poultry department, Mr. Gilbert is doing, with his feathered pets, work similar to that being carried on in the other branches with the larger sorts of live stock on the farm. His is not the least interesting or least important work.

In the seed-testing branch, over 1100 samples of seeds were tested for farmers, and reports made to them thereon, setting forth the per cent. of vitality and the vigor of growth ot the plants. Any farmer may send a small package of seed free by mail, and have it tested in that way. From the seed distribution department are sent out a large number of 3 pound bags of wheat, barley, and oats of promising varieties. Over 12,000 bags were sent out during the Spring of this year. Everyone who receives a bag is expected to return not less than one pound of the grain grown from it, together with a filled-up report stating the date of sowing, the time of ripening, the yield of grain, etc. Time will not permit me to go into any further details or description of the Central Farm, but a brief statement of what I observed on the branch farm at Brandon, in your own Province on the occasion of my visit there this week, may have particular interest for Manitobans.

### BRANDON EXPERIMENTAL FARM.

The Superintendent, Mr. Bedford, is a gentleman of wide, varied and long experience in agricultural matters in this Province, and seems to have the combined and happy knack of imparting information to visiting farmers and communicating to them a measure of his own enthusiasm in testing native grasses and planting trees for fruit, as well as those for wind breaks and ornamental purposes. Every farmer in Manitoba who can make it at all convenient to do so, should pay a visit to the Experimental Farm and see for himself the nature and extent of the work that is being carried on. One day spent in observation of the different plots of grain, grasses, corn, roots and trees, will be more serviceable than the reading of a fifty page report. There are being tested the following numbers of varieties of grain, etc.

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Wheat, 123 varieties; oats, 83 varieties; barley, 65 varieties; Indian corn, 33 varieties; grasses, 24 varieties of cultivated sorts; grasses, 25 varieties of prairie grasses; turnips, 7 varieties; carrots, 8 varieties; potatoes, 100 varieties, (fifty new seedlings originated on the farm); pease, 18 varieties; beans, 22 varieties; beets, 5 varieties; mangels, 5 varieties.

Investigations are being carefully made in the effects of different methods of cultivation. Seeding by the press drill, the drill, and broadcast are being compared. Fall sowing on November 3rd is being compared with spring seeding on April 5th. Different methods of summer fallowing have been put to the test on the same sort of land. In short, every effort is being made to discover the methods of cultivation and varieties of seed, that are likely to give the best returns to the farmers of Manitoba. Mixed crops of various cereals have been grown with gratifying success, as a means of providing winter fodder in a convenient and controllable way. As much as four tons to the acre of cured fodder has been obtained from oats and pease. The crop of Hungarian grass is one that could hardly be excelled in any part of the Dominion; and not a few of the native grasses promise to meet the already felt want of Manitoba farms for a mixture of grasses with which to seed down for cultivated hay. Of the 33 varieties of corn being grown, some half dozen varieties promise to reach the glazed stage of ear or the condition when the plants are at their best for use as ensilage.

Of the many other things of interest which I observed, I will mention but a few more. The common garden vegetables were healthy looking and large. Tomatoes do not ripen there, but a fair crop can be obtained in the green state, fit for pickling. The gorgeous masses of flowers in the garden is a standing rebuke to the impression of those who have talked about it being impossible to have out-door flower gardens in Manitoba. Petunias were there in profusion; the sturdy portulaca vied in beauty with the clustered balsams; the luxuriant border of wild flax hedged in asters, verbenas, stocks and many other gay colored dandies; caliopsis phlox, dianthus, and modest pansies were plentiful; and the zinnias held their numerous heads up rather saucily, as they looked down on sweet alyssum and across at pompous double poppies. I counted over thirty varieties of flowers which all seemed to be doing well.

Among others of the small fruits, raspberries, blackerries, black, white and red currants and gooseberries seem to do well.

Some of the ornamental shrubs have stood the winter without injury and have made vigorous growth during the summer. The white lilacs are doing better than the other varieties of that favourite shrub. A growthy hedge for a wind break has been planted of Manitoba maples, about two feet apart. They are doing well and are four feet high at three years from seed. The mountain ash in some cases has made a growth of three feet this season; the native elm, the Ontario soft maple, the birches and poplars are hardy and growing well. A cut-leaf birch, one of the most beautiful of ornamental trees, is growing with wonderful vigor. I advise you to look out for Mr. Bedford's annual report and to read it carefully.

### INCREASING THE NUMBER OF CATTLE.

Before I pass on to say a word of dairy work and methods, let me urge upon you and the people of Manitoba, the need for paying earnest heed to increasing the number of cattle. Still it is better to have a small number of excellent and profitable cattle than a large herd which yields no fair return. Too much care cannot be given to the selection of the males. It will pay the community for agricultural societies to introduce thoroughbred bulls from milking strains of cattle, where private enterprise has not already done so or is not likely to do so. The value of inherited good qualities is so great that no farmer should use a sire which has not both good points and good breeding.

The raising of calves can be profitably carried on in conjunction with butter-making. Early calves, as a rule, make the most thrifty animals. Besides, a cow that calves early in the season will give more milk during the year than one that

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calves at the beginning of summer. Calves can be reared in good form by the feeding of whole milk for ten days. Skim milk fed warm and sweet may be gradually added, until at the end of another week the calf will be drinking skim milk only. A mixture of oats and bran should be fed to replace the cream which has been removed. The grain or meal should be fed dry after the calf has finished drinking. That will induce the swallowing of saliva and thus aid in the digestion of the milk. Scouring is frequently caused by the feeding of raw meal in milk, but never by the feeding of it dry after the milk.

### WINTER FEEDING.

In the feeding of cattle during the winter, due regard should be paid to their comfort. Tha stables need not be large, but they should be warm and comfortable. In proportion as animals are kept comfortable are they able to do well for their owners. A very cold stable causes the consumption of more feed and leaves the cattle weak in the spring. The cows especially should be fortified for a long season's milking by being well fed in warm stables during the winter. The abundance of straw should enable farmers to construct stables, where the temperature will not go much below freezing point.

### FAT GLOBULES IN MILK.

While her milk is being elaborated by a cow, the ends of the cells which line the inside of the milk-ducts and vesicles in her udder, seem to enlarge. Each one forms a small globule, and when that is perfected it drops into the serum of the milk. Each bud or globule, so formed, is a globule of fat; from them is made all the butter from cow's milk. These tiny buds of fat seem to grow on the surface of the cells, partly by the destruction of the cells, and partly by conversion of some of the substance of the blood into fat. They trickle down in and with the milk, and are held in suspension, not in solution, as are the other solids in it. They mostly come during the latter part of the milking, probably because they do not move so quickly or easily as the liquid part of the milk. The fore-milk is thinner than the strippings, because the globules of fat do not free themselves from the internal linings of the milk ducts so quickly as the liquid of the milk. The condition of the cow's blood and her nervous system very largely affect the quality of the milk she gives. Bad feeding, foul water or the absence of salt will induce in the cow a condition in which she will not yield good milk; a similar condition with its consequent effects may be caused by neglect, exposure, abuse or excitement. A cow has a peculiarly delicate organisation and must be handled with kindness; and any man who abuses a cow beats out the profit, for she will pay him back by giving less milk, and that of a poorer quality. The globules of fat before mentioned, are so numerous that in a thimbleful of milk there will be found millions of them. It is estimated that there are at least one thousand millions of them in every cubic inch of milk. From these specks of fat the butter is made.

### CREAM SEPARATION.

To get them out of the milk is the task of the butter-maker; they are too small to be strained out with the finest sieve; fifteen hundred of the largest of them placed side by side, like a row of marbles, would not measure more than one inch. If milk be left at rest, they will rise to the top because they are lighter than the liquid in which they float. The heavier parts of the milk are drawn down by the force of gravitation, and as the serum of the milk, composed of water, casein, sugar, albumen, etc., moves downward, it displaces the cream globules and forces them towards the top. There are two methods of separating these fat globules from the milk; a natural method and a mechanical method. In the natural method, the power of gravitation is used to pull the heavier portion of the milk down, with the effect that the lighter parts, the fat globules, are pushed upward. In the mechanical method, centrifugal force is applied to attain a like result. When a quantity of milk is put into a rapidly revolving vessel or cylinder, the heavier parts will be forced

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outwards against its resisting side or inner surface with sufficient pressure to push the lighter particles, the globules of fat, towards the centre of revolution. In that way the water, casein, albumen and the other heavier constituents of milk, find their way to the outside of the quantity being treated in a revolving cylinder, while the globules of fat are collected in concentric form on the inside surface of the quantity being treated. This is the law, that the cream, mainly composed of fat globules, travels in a direction opposite to that of the force exerted upon the milk, whether the force be centrifugal or centripetal.

### EFFECT OF TEMPERATURE.

If ordinary milk in a deep-setting pail, be left at a temperature of 60° Fahr., it would take these small specks from three to six days to get to the top at the rate at which they would move. They can be helped to move faster. The milk at a temperature between 90° and 98° is slightly enlarged in bulk, and by putting it into deep-setting pails at a higher temperature (90° to 98°), the advantage of a falling temperature from above 90° to 48° or 45° may be gained. That treatment will expedite and facilitate the upward movement of the globules of fat. The rapid cooling of the milk is also believed to prevent the formation of a delicate mesh of lacto-fibrin in the milk, which would hinder the globules from rising freely.

### CREAM.

The cream itself is only that part of the milk into which the globules of fat have been gathered in large numbers. Cream has no regular or constant per cent. of fat; the range is from 8 per cent. to 75 per cent. In one hundred pounds of cream there may be only eight pounds of butter, or there may be seventy-five pounds, according to its quality of richness. The globules of fat have no skin or organic coverings distinct in constitution from their own substance. Like drops of quicksilver that have separated from each other, they have no pellicle. But sometimes the serum of the milk becomes so viscous, that a quantity of it will adhere to the surface of the globules and, like a coating of gum, will prevent their movement upward when the milk is set, or the movement inward when the milk is treated in a centrifugal machine. If a quart of warm water be stirred into every pailful of milk when it reaches the dairy room from the stable, the separation of the cream will be facilitated. The water may be at a temperature anywhere between 150° and 10° Fahr., and should be warm enough to raise the temperature of the milk to above 90°.

### CHURNING.

In the winter season especially, difficulty is experienced sometimes in churning the cream. The addition of water at a temperature of 70° to the cream, while it is still sweet, to the extent of 25 per cent. of its bulk, will cause it to yield its butter in less time and more completely. The water should be added before the cream is sour and at least 20 hours before the churning is commenced. The next treatment required is the development of lactic acid. If a quantity of *sweet cream* be churned, and an equal quantity of *sour cream* of the same quality as to composition be also churned, there will be obtained on the average from the sweet cream only 77 pounds of butter out of every possible 100 pounds, while there may be obtained from the sour cream 97 pounds of every possible 100 pounds. There are thousands of pounds of butter lost in the Dominion annually from the churning of two qualities of cream in the same churn at one churning. The only safe plan is to have all the cream for each churning thoroughly mixed from 12 to 20 hours before the operation begins. It should be kept at a temperature of from 60° to 70° Fahr. according to the season of the year, to permit it to become sour. The higher temperature is required during the winter season, and for cream from centrifugal separators during the summer season also. The churning is performed for the purpose of causing the globules of fat to strike on to each other and by impaction to unite. If two globules strike each other at a suitable temperature they will stick together; when large



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numbers of them unite in that way, it is said that the butter has "come," and the particles may be washed and removed. All that is required in the churning of cream is that the serum or medium shall be properly treated: (1) by the addition of water if required, as already described, (2) by the development of acid, (3) by the temperature being kept at from 57° to 59° in the summer time or from 62° to 66° in winter. It is imperative that a thermometer should be used to reveal the temperature.

### GRANULAR BUTTER.

When the butter particles are half as large as clover seed, 10 per cent. of cold water may be added to the contents of the churn. After they are gathered to be half as large as wheat grains, the churning may be stopped. The buttermilk may be removed and replaced by pure water at a temperature of from 50° to 55° Fahr. It may thus be washed in the granular state. When the water runs off free from a milky appearance, the granular butter should be left in the churn for half an hour to drain.

### SALTING.

It may then be salted in the churn or removed to the butter worker for that purpose. Pure salt of fine velvety grain only should be used. The rate of salting should be regulated to suit the taste and requirements of the customers. From three quarters of an ounce to one ounce per pound will be found acceptable to most of those who purchase Canadian butter. The preparation for the market should be made with a view to giving the butter an attractive appearance, whether it be packed in tubs or firkins, or finished in prints or rolls.

### CO-OPERATIVE DAIRYING.

As soon as possible more co-operative creameries and cheese factories should be established. Detailed information, sketches of plans for buildings, particulars of equipment and management will be furnished free on application to the Dairy Commissioner, Ottawa. When the butter is made in creameries, it will have a uniform quality and excellence which will enable it to become an article of commercial importance. The making of butter by skilled workmen in factories will solve the problem to some extent of keeping more cows, while domestic help is so scarce. Cheese factories should succeed well in localities where the settlements are close enough to permit the economical gathering of the milk.

### SHEEP AND PIGS.

Then to dairy farming can be added sheep husbandry. I am told that sheep do well on your prairie grasses and in your climate. The feeding of a larger number of hogs would doubtless prove a paying branch of farm work. Sometimes grain that would not bring the highest market price by the bushel, can be marketed to more advantage in the form of pork than when sold in bulk.

### CONCLUDING REMARKS.

In conclusion let me express the hope that the business men, the professional men, as well as the farmers of Manitoba, will aim to promote the prosperity of agriculture in your province by giving more attention to such branches of mixed and dairy farming as your country is adapted for. Every enterprise and occupation here is dependent directly or indirectly upon farming for its pay and its profits; and whatever will strengthen the hands of the farmer in his efforts to make his work pay and to give stability to his profits, will be for the benefit of every citizen. No new gospel need be proclaimed. In Manitoba, as elsewhere, something is not to be gotten for nothing, if gotten honestly. Skilful attention to their own affairs, good management, and diligent labors have brought comfort and competence to many of your farmers. Others who are here, or who may come, need expect no

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better and no worse experience. I have faith in the future of this vast western part of the Dominion of Canada. It is destined to be the home of millions of energetic, sturdy, contented, and prosperous people, who may find here every essential condition for the maintenance of happy homes with the enjoyment of every institution dear to a loyal Canadian, British people.

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MANITOBA.

I had left Owen Sound on Saturday, the 9th of August, by the S.S. "*Alberta.*" The *Alberta* and her sister ships are making a trip across the Great Lakes a favorite one for travellers whom inclination, business or other duty takes westward.

*Winnipeg*, the metropolis of the west, was the first place where a gathering of the farmers was met. From the *Capital of Manitoba* a journey was taken southward by way of Morris to *Manitou.*

*Manitou* has a cheese factory which was turning out six cheese per day, and these of good quality. The proprietor receives 2¾ cents per pound of cheese for collecting the milk, manufacturing the cheese and providing all necessary furnishings. He also retains the whey for the feeding of hogs at a convenient distance from the factory. The country is well-watered. Wells of a depth of from 18 to 20 feet afford adequate supplies for house and cattle use. Twenty-two carloads of live stock had been shipped from that district on one day, about a fortnight before the date of my visit. The farmers realized an average price of about 2¼ cents per pound live weight. Good land in that vicinity and in fact throughout most of the southern part of Manitoba can be bought for from $6 to $8 per acre. At a meeting in the Town Hall in the evening, a good deal of interest was manifested in the work of the Experimental Farms in connection with the distribution of grain, and particular inquiries were made and information given as to the possibility of growing suitable fodders and of erecting silos in that neighborhood, that the cattle might be fed to more advantage and at less cost during the winters.

A team and waggon were taken from Manitou by way of Pilot Mound to *Glenboro.* The first part of the journey was through a beautiful rolling country with occasional clusters of small poplar trees. The grain was rather short in the straw from drought in the early part of the season, but it promised to yield a more than average crop. The Pembina River was crossed twice. Between its banks and the quietly beautiful Tiger Hills, we passed through a country with a rolling surface. The Tiger Hills District carried excellent crops of uniform good quality, but the stage of growth was rather later than in the districts surrounding Morris, Manitou and Pilot Mound. Out from Glenboro we visited a few herds of cattle and then passed on to the very satisfactory settlements of the Icelanders, to which reference has been made in the foregoing address. Most of them settled in that locality from nine up to three years ago. Those who were first there, had from 150 to 200 acres under crop, and owned large numbers of cattle and good horses. Seventy head of two and three year old steers were purchased in that neighborhood a little earlier in the season, at an average price of $33 per head.

From Glenboro a drive was taken to *Wawanesa*, a new town on the bank of the Souris River and on the Northern Pacific Railway. It was barely six months old, but promised to rival in importance some of the older places on the line. From Wawanesa to *Brandon* the trail took us across an undulating country with every evidence of being suited for carrying a large population of farmers in the near future. From Brandon to *Portage la Prairie;* from Portage la Prairie to *Shoal Lake;* from Shoal Lake to *Minnedosa;* from Minnedosa to *Rapid City;* and from Rapid City to *Brandon* completed the round of my programme of meetings in Manitoba.

NORTH-WEST TERRITORIES.

*Mossomin* was the first stopping place in the Territories. A fine agricultural district surrounds it. By way of illustration, I may mention the fact that on the



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farm of Mr. Bobier, some three miles out from the station, I saw a 14 acre field of fine even wheat of the Assinaboia variety, which was the harvest from *one grain* obtained by Mr. Bobier four years previously. The capabilities for an enormous production from the soil of the North-West, is almost beyond the possibility of exaggeration, when the right variety of grain is sown, good cultivation is given and favorable weather prevails.

At *Broadview* the farmers of the vicinity had brought to the town hall a display of roots and grains which was very creditable to their district and also to their enterprise. A drive across to the Weed Hills took me past several large areas of wheat, which were being harvested in fair condition and only slightly damaged from the frost of 22nd August. At this place, as elsewhere in the North-West, sleughs, ponds and streams seem to have dried up wonderfully within the last few years. Weed Lake, a basin about 8 miles long and less than a mile wide, is nearly 8 feet lower than it was 8 years ago. A tradition exists in the West to the effect, that the periods of drought and rainy weather alternate with each other every 7 years; and the abundant rains of 1890 are held to be the beginning of the rainy seasons and therefore of large crops. An uncontrollable obstacle to the success of farming operations in the West is that of insufficient rain, to fill the reservoir in the sub-soil for the sustenance of the crops during the summer. The selection of early-ripening varieties, and more careful preparation of the soil, will doubtless enable the farmers to overcome all the drawbacks that have existed in the past from summer or autumn frosts; and the combination of mixed and dairy farming with that of grain-growing, will be a protection and source of income to the farmers in any season when profitable crops of grain may not be secured.

From *Wolseley* I was conducted by Senator Perley to the Qu'Appelle Valley. The Qu'Appelle River which, within the memory of living settlers, was nearly a mile wide, has shrunk until it is only a tiny thread of water, crawling deviously along the wide deep valley which was its former bed. The southern banks only are wooded; and the strange bare hills, rounded and worn into ghastly shapes by rains and winds, make one think,—until he gets on the heights,—that all beyond must be desolate.

The Qu'Appelle Valley and the country between it and the main line of the railway is admirably adapted for cattle keeping. Senator Perley has erected a substantial stone dairy house; and the butter product from his farm is sent across to New Westminster, B.C.

From Wolseley the distance to *Indian Head*, where the branch Experimental Farm for the North-West Territories is located, is about 12 miles. When I first visited the farm on the 18th of August, the crops of wheat, barley and oats were as uniformly heavy and fine as had been seen anywhere on this continent or in Europe. A blighting frost had struck the harvest fields before all the grain was ripe, and in consequence, damage and loss were sustained. Mr. Angus Mackay, the experienced Superintendent of the farm, is most enthusiastic in his work in instructive and experimental agriculture. During the season there were tested no less than 31 varieties of *barley*, 16 of *oats*, 7 of *pease*, 30 of *Indian corn*, 8 of *turnips*, 5 of *mangels*, 5 of *carrots*, 15 of *cultivated grasses*, 8 of *native grasses*, 3 of *sugar beets*, and 102 of *potatoes*, besides *millets* and *mixed crops* for fodder purposes.

Back from the Experimental Farm at the homestead of Mr. Harvey, I found a unique and easily provided windbreak surrounding a garden in which were growing in hardy abundance, *rhubarb*, *potatoes*, *beans*, *celery*, *parsley*, *tomatoes*, *squash*, *chicory*, *black currants*, *wild gooseberries* and *citrons*, besides many *other vegetables* and *fruits*. The windbreak was made by the planting of slender poles close together and the growing of wild hops over them, which in their climbing bound the whole securely together.

Mr. Mackay accompanied me to *Regina*, where the local committee had arranged for the holding of two picnic gatherings, at which addresses on agriculture should be made. I take the following account of the preliminary proceedings at

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*Wascana*, where the first meeting was held, from the columns of the *Regina Leader* :—

"Notwithstanding the busy time there was a large attendance at the old Cross-"ing. The North-West Mounted Police Band was in attendance under Sergeant Huntley "as Bandmaster. His Honour the Lieutenant-Governor attended by Capt. Allen "arrived in time for lunch, which had been provided with generous hospitality by "the ladies of the neighbourhood.

"Mr. Jelly, M. L. A., as Chairman of the Committee, said they were favoured "by the presence of the Lieutenant-Governor, who took a great interest in the progress "of the farmers of this country; and it was the desire of the Committee that His "Honour should preside. (Cheers.)

"Lieutenant Governor Royal expressed the pleasure with which he accepted "the invitation to attend the pic-nic which would be devoted to practical ends. He "congratulated the ladies on coming in such numbers, for in such a gathering the "men were ordinary vegetables while the ladies were the flowers. He dwelt on the "deep interest in agriculture which had been shown by the Dominion Government, "and referred to the fact that he himself had been the means of bringing up the first "centrifugal cream separator to Manitoba. Now there were no less than seven "cheese factories and six or seven creameries. Their parliamentary representative, "Mr. Nicholas Flood Davin, naturally took a great interest in the welfare of his "constituents and their general progress. He pointed to British Columbia as the "great future market for the North-West. He concluded amid cheers and then "called upon Professor Robertson.

"Professor Robertson :—Your Honour, ladies and gentlemen, the only business "in which our Queen engages is that of agriculture; and I am very glad indeed to "come to Regina, the Queen City and Capital of the North-West. It is widely "famed for its wealth of soil and affectionate mud. But still further, Regina is "known throughout the length and breadth of Canada as the residence of one of your "talented citizens, who has won for you a reputation not only in the Dominion but "abroad. Among all the men who meet at Ottawa every year to legislate for the "country and to discuss ways and means whereby the Government can promote the "development of its resources, there is none better known for the brilliancy of his "intellectual keenness and the light, graceful wit with which his arguments are "feathered and driven home than is your worthy representative. He takes a deep "interest in agriculture, doubtless because his constituency is essentially an agricul-"tural one. He is a man of keen perception who knows that all must live out of "the fruits of the soil.

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"That there are grave difficulties in the way of keeping large numbers of "cattle for dairying and beef production in the North-West Territories, I know very "well; but these are not insuperable. Pasturing facilities during the summers are "unsurpassed in any other part of the world. The prairie grasses are not only "plentiful but exceedingly nutritious. When the supply of wild hay becomes "insufficient for the needs of the herds, a cheap and suitable winter fodder can be "obtained by the growth of mixed crops of oats, barley and peas. Then Hungarian "grass and millets grow remarkably well. Comfortable quarters for the winter can

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"be provided by the erection of turf stables with a liberal use of straw and poles "until lumber is well within the purchasing power of the farmers' purses.

"Canada is the country of the world where cattle are most free from diseases "and where animal vigor is capable of rendering the best service and yielding most "profit to the people. The North-West is a long distance from the great centres of "population where the consumers of her products live. Hence it will pay the peo- "ple to concentrate, as far as possible, the quality of the farm products, so that the "smallest per cent. of their value may be absorbed by transportation charges. It "need not cost much more to carry a tub of butter to England than a bushel of "wheat, when large quantities of it are handled.

"Then the keeping of more cattle would furnish profitable employment for the "rural population during the winters. When men are employed for the summer "months only, prosperity is not so permanent."

The second pic-nic gathering assembled at the *Bluffs* on the following day. The district there seems to be admirably adapted for cattle-keeping and horse-raising.

*Maple Creek* was the next appointment. From there, by the courtesy of Inspector Saunders of the North-West Mounted Police, I was driven out into the Fish Creek district and saw some excellent cattle in very fine condition. From all the inquiries that I made, I learned that ranching upon a small scale with herds of from 200 to 300 animals had been very profitable ever since its commencement. With a small herd the owner is enabled to put up enough hay for feeding during the storm periods. The cattle become accustomed to seek the shelter and service of the turf sheds which are erected, when a storm blows up. They are thus saved from wandering long distances from the homestead. Then the cows which calve during the winter can be looked after and a larger percentage of increase is obtained yearly. From these combined gains, the profits from ranching with smaller herds, not exceeding 350 head of animals, have been very satisfactory. The country towards the Cypress Hills is rolling and affords excellent pasturage summer and winter, with the exception of the storm periods which have been mentioned already.

A round-up is held twice a year for the branding of all calves. The Live Stock Association of each neighborhood superintends that work. Calves which may have escaped branding and which are not found with their dams, are termed "Laverocks." (A man of too covetous a disposition who used to appropriate all such for his own herd, has his name perpetuated in the English language in this most unenviable way). Before the branding is completed at each round-up, these calves are put up at auction and sold to the highest bidder. The proceeds are applied to the payment of the expenses of the round-up. The balance, and, in fact, the main expenses are met by *pro rata* assessments upon those whose cattle have been handled.

*Medicine Hat* was the next stopping place and then *Calgary*. From *Calgary* a drive was taken south as far as *Davisburg*, a postoffice some 24 miles distant. That country is admirably adapted for stock-keeping. The pasturage is thick-bottomed and stands eating by large herds. The settlement is yet too sparse for the introduction of co-operative dairying, but that will come shortly. The long distance from large-markets, both east and west, necessitates that the products be concentrated into the smallest bulk with the highest value. The ordinary cereals do well in the Calgary district, and roots of enormous size and wonderful yield per acre can be grown very easily.

From Calgary the first view of the Rocky Mountains was obtained. The range of giant hills with their snow clad tops and sides, seemed like the uttermost ends of the earth, where pillars had been left to support the edge of the horizon. A closer acquaintance with the Rocky Mountains intensifies the emotion,—approaching to veneration,—which their first sight awakens. As their mighty masses tower above the slender threads of iron on which the railway trains move, the *greatness of nature* and the *littleness of man in a material sense*, are brought into startling contrast.

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One of the greatest engineering feats achieved on this continent during the century by the building of the Canadian Pacific Railway across these mountains, has hardly disturbed the shape of their sides in a perceptible measure; and yet the *superiority of the mind of man*, to *matter in its most gigantic massiveness*, is revealed by the masterful way in which he has made its substances further his ends and serve his purposes. Coal and silver and gold are being taken from the stolid hill sides. From the eastern Foot Hills of the Rockies to the most western slopes of the Coast Range, the iron roadway, the stations, the mines, every handprint and footprint of man reveal the *mastery of mind over matter*; and when farmers on level plains, undulating fields, or mountainous regions, believe in and follow similar methods embodying the same principles, they will ennoble agriculture and its tasks to an equality with the highest of other work.

A few stopping places in the mountainous region were touched at. Among these were *Banff*, *Field* and *Glacier;* but as this report is treating mainly of the agricultural aspect of the country, I refrain from saying what I might say of the wonderfully thrilling pleasure which a trip through this intensely grand region gives to any lover of the beautiful and sublime in nature. If an impassable gulf should be opened between the Rockies and Ottawa, some of us who have seen them once, would be resolved to go around the earth the other way if necessary, in order to enjoy another gaze.

### BRITISH COLUMBIA.

At *Kamloops*, B.C., no meeting was held, as some misunderstanding concerning the date of the meeting had arisen from the absence of the gentleman with whom correspondence had been carried on.

The *Experimental Farm for British Columbia* at *Agassiz* was visited. The surprisingly rapid and luxuriant growth of plants in British Columbia seems almost a tropical quality. The gigantic-growing ferns among the underbrush in the woods, often rise to a height of 6 or 7 feet. The report of the *Agassiz Farm* will be full of interest and service, especially along the lines of its fruit culture in the near future.

A visit was made to *New Westminster*, when it was learned that the agricultural meeting had been put off until one of the days of the holding of the annual exhibition, which I purposed to take in on my return journey.

From *Vancouver* to *Victoria* the journey was quickly made by the S.S. "*Islander*." At *Victoria* a meeting was held in the Philarmonic Hall; and the following is taken from the beginning of a newspaper report of the gathering. It is inserted because it contains some of my views with reference to the lumbering and other industries of British Columbia, which are no less important to the people of the Dominion than is that of its agriculture:—

"Prof. J. W. Robertson, Dominion Dairy Commissioner, lectured last evening in "Philarmonic Hall on a subject, in fact, several subjects, of absorbing interest to the "farmers of British Columbia. * * * He said he had been very much "gratified by the evidences of enterprise, prosperity and rapid expansion everywhere "visible in the city of Victoria. He had been led to expect rather a quiet sylvan "place where wealthy English people came to seclude themselves; but here he found "the people Canadian in every sense, in their desires and efforts for the development "of the magnificent resources of this rich province, of which the queen city, Victoria, "is a most worthy capital. The subject of farming has as yet received but little "attention from the citizens who have made their homes in this western part of the "Dominion, owing to the ease with which the necessaries and comforts of life could "be gained from other sources. The vast lumbering enterprises of this province are "the pride of the Dominion and may be capable of an unfailing source of profit. The "careful husbanding of the timber, and a judicious regard for the renewing of the

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"supply by protecting the young trees from the ravages of fire will save what will "eventually mean millions of revenue. Reckless devastation will not merely strip "the beautiful mountain slopes, but will mean a diminution of the contents of the "treasury. Of mining the professor did not speak, simply saying that as a Scotch-"man he had no regard for gold (laughter). He had to confess that he came here "rather sceptical concerning some of the stories told regarding fruit growing in "British Columbia, but convincing evidence had been brought forward to prove that "British Columbia could produce more fruit to the tree and the acre than any other "portion of this favored Dominion. The markets of the North-West are open for "the fruit of this genial climate. As yet this industry has hardly been tested as to "its possible profit giving. The climate which produces such beautiful fruit, and "promotes the growth of such truly gigantic trees, must be one well adapted to the "cultivation of such forage crops as will enable the farmer to keep horses and cattle "at the lowest possible cost. The healthfulness of the climate is already widely "known, but the adaptation of this country for profitable farming has hardly been pre-"sented in the best way to those farmers in Eastern Canada who desire to come out "West. It is not the least important of the Professor's objects that he may gain the "requisite information to give to the farmers of Eastern Canada, in order to guide "them in forming a safe judgment in favor of the western provinces."

On Vancouver Island meetings were also held at *Saanich Hall* and in the *Comox* valley. The agricultural areas in *Vancouver Island* are but small compared with its extensive area of rugged mountain. The *Saanich Valley*, *Cowichan Valley*, and the *Comox Valley* comprise the most of the settlement occupied by farmers. These valleys will not average more than 50 square miles each, but nature is wonderfully productive, and generous in her gifts from the soil to those who till it there. Considerable quantities of excellent butter are produced and sold the year round at prices from 30 to 50 cents per pound, when the quality is good.

At *Nanaimo* no less than 8 large ships, of from 2,000 to 4,000 tons burden, were in the harbour waiting to be laden with the superior coal which is to be found in many places on that coast.

On the return journey I was fortunate enough to be able to attend the Agricultural Exhibition at *New Westminster*. In all the departments a most creditable display was made. The cattle of the Holstein and Jersey breeds were exceptionally fine. The display of dairy products in point of quality was not behind the best to be seen at the large exhibitions in Ontario and Quebec. It fell to my lot to do the judging of these articles at the Exhibition, and their superior quality further convinced me of the adaptation of our most westerly Province for a large development of its dairying and cattle-keeping industries.

The value of agricultural exhibitions depends very largely upon the educational turn which is given to their displays, both by the arrangement of the articles and the judging of the same. Dissatisfaction on the part of the exhibitors of all products, results frequently from lack of information as to the points that have guided and governed the judges in their decisions. Wherever possible, I think a record of the points of excellence of the article or animal should be left with the exhibitor; and for the judging of butter and cheese, I here put in *forms of cards* which could be printed by the Exhibition Associations and provided for the use of the judges, as already indicated:—

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..... Exhibition,

1891.

## DAIRY DEPARTMENT

*Exhibit of* ..... **BUTTER**

*Section* ..... *No.* .....

*Exhibitor* .....

*Residence* .....

### JUDGES' REPORT.

| | Perfection. | Points Awarded. |
|---|---|---|
| **Flavor**..... | 40 | ..... |
| **Grain**..... | 30 | ..... |
| **Color**..... | 15 | ..... |
| **Salting**..... | 10 | ..... |
| **Finish**..... | 5 | ..... |
| **Total**.... | 100 | |

*For the Judges*.....

*Remarks*.....

.....

.....

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Exhibition,

1891.

## DAIRY DEPARTMENT

*Exhibit of* ..... **CHEESE**

*Section* ..... *No.* .....

*Exhibitor* .....

*Residence* .....

### JUDGES' REPORT.

| | Perfection. | Points Awarded. |
|---|---|---|
| Flavor..... | 35 | ..... |
| Quality..... | 25 | ..... |
| Texture..... | 15 | ..... |
| Color..... | 15 | ..... |
| Finish..... | 10 | ..... |
| Total.... | 100 | |

*For the Judges*.....

*Remarks* .....

.....

.....

The following report of the introductory part of the meeting at *New Westminster*, as taken from the local press will set forth some views of British Columbia for the information of Eastern Canadians who may be looking for them from the pages of this report:—

"Mr. Thos. Cunningham presided, and briefly introduced the lecturer, who was "well received. The Professor said he had come into the Province, and visited their "exhibition rather to learn than to teach,—to learn in fact the capabilities of British "Columbia and carry the knowledge of them back to Eastern Canada. This was a "splendid dairy farming country; though they, in their modesty, had not yet realised "the greatness of their resources in this respect. Their province was one of the finest "in the Dominion, as would be discovered when its people learned to use all its resources "in the right way. He had been much struck by many things in the exhibition, and "others he had noted outside it, and some of these he would talk about that night. "People were often too reckless of their good reputation. Let British Columbians

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"therefore, guard their excellent one carefully. He had noted during his visit the "vast recent development of their mining industries. They were exporting their "minerals and importing much of the miners' food, though they should be able in the "fertile valleys between their beautiful mountains to grow all the food thus needed. "Then, too, their lumber interests were growing fast; and they in Eastern Canada, at "least as far as Manitoba, knew what good work came from the New Westminster "mills. But in lumbering there was too much waste and too little protection of "forests. Good timber was (he thought) sometimes, from want of care, destroyed, "and there was much land, which was only fit for tree planting, left unused. 'Plant, "as well as destroy,' was his advice. What, nevertheless, he learnt was this, and he "should return to East Canada with the news of it,—that Canadians need not go south "of the border for good land. Really British Columbians, unlike their Yankee neigh- "bours, were too modest in talking about their resources. It was false to say as he "heard in the east, that British Columbia was only a sea of mountains. It had ample "capacity of soil to feed a vast population engaged within its borders in fisheries, "mines, lumbering and other industries. Then as to *New Westminster* itself. He "could tell them that their district was one of the most fertile in beautiful Canada; "and it must therefore be permanently prosperous. But farmers in their part took "up too much land. 'Men get too thin when they spread themselves out too far' "(laughter). 'Better would it be to farm small areas thoroughly. Better farm five "acres well than 25 poorly.' Nowhere in the world was there, he thought, a better "chance for cheap and profitable production. Certainly nowhere else in the Dominion, "was the growth so rapid, or the yield so generous as in British Columbia. 'Apply "skill and don't farm too much land, recognising the fact that a little land here pro- "duces much. You have also good local markets and get more for your produce "than the people of the North-West, Quebec, and Manitoba. Produce cheaply by "producing much.' There was, the lecturer added, too little produced to the acre, "and too many men looked mainly to Providence to work their farms. There were "too many men of leisure on the farms in their Province. Their exhibition should "teach them much as to improved methods of feeding and management of stock and "as to the best breeds of horses and sheep and varieties of grain. He could, after "visiting their show, give a flat contradiction to the statement often heard in Eastern "Canada, that British Columbia could not grow grain. They grew it indeed of very "superior quality. Yet farmers might produce even better by getting to know why "one grain gave a better yield than another. The judges at shows like theirs should "specify particularly the points of superiority of one head of stock over another, and "of one farm product over others. An exhibition like theirs did good, by rousing the "enthusiasm of the farmer and showing him that he was no mean factor in the com- "munity. It was in fact part of their educational system, and though some thought "Canadians lacking in culture, he found people nowhere else who knew so much of "their own business and liked to know it,—without putting it all into practice."

### PRINCE ALBERT AND FORT QU'APPELLE.

From *New Westminster* the journey eastward and home was made with but few interruptions or delays. From *Regina* the trip was extended to *Prince Albert* by way of the newly opened railway, 247 miles in length. In the *Prince Albert District* the British Tenant Farmer Delegates were met; and in company with them the district surrounding the town was hurriedly examined. We found there excellent samples

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of two-rowed barley and Ladoga and Red Fife wheat. Since my return to Ottawa, one sample of Ladoga wheat has reached the Experimental Farm from Mr. William Plaxton, M.L.A., Prince Albert, almost perfect in its appearance and weighing 66 pounds to the bushel. The Prince Albert region is well watered and offers many inducements to those who wish to insure steady prosperity, by engaging in mixed farming and cattle keeping in the North-West.

From *Prince Albert* to *Fort Qu'Appelle*, by way of *Regina* and *Indian Head*, was the next stage in the journey, At *Fort Qu'Appelle* an agricultural exhibition was being held; and it has never been my good fortune to see any other exhibition building where there was so small a proportion of inferior goods. The quality of the roots and vegetables was most excellent. The butter was superior in flavor and body. The grain, although only a few samples were exhibited, was first-class; and one three year old steer, which had been fed mainly upon straw and hay, turned the scales at 1,895 pounds.

### CONCLUSIONS.

The return journey to *Ottawa* was made by the North Shore route; and the *Central Experimental Farm* was reached on the 13th of October. After the trip twice across our own country, I am more firmly convinced than before, that *dairy farming* with special attention to the production of butter during the winter, cheese during the summer and beef and bacon the whole year round, are the lines of agriculture which our people in most regions can follow with the greatest certainty of profit and enduring success. The vastness of the area of land, some 3,500 miles one way and 1,400 the other, offers many inviting fields to agriculturists from other lands. Our climate is invigorating and healthy; our resources are as yet hardly recognised; in timber and minerals and fish, nature has been more bountiful to us than to any other nation of equal population and age; and the opportunities in our country for successful agriculture are peerless. The progress and prosperity of the Dominion must depend almost wholly upon the way in which our people apply themselves to make the most of these things, by self-reliant exercise of skill in their various spheres of endeavour.

## VI.—DAIRY BULLETINS.

Dairy bulletins, to the number of seven, were issued at intervals during the year. Their first purpose was to spread useful information bearing upon *Dairying* in the Dominion of Canada, for the benefit of the farmers. Their aim was to help in the education of the ordinary farmers and those whose occupations are associated with dairy husbandry, rather than to furnish data of interest only or mainly to scientists. In order to gain the widest possible publicity for their contents, they were written in a style to make them acceptable matter for publication by the newspapers of the country. A special *newspaper edition* of each,—printed on one side only—was sent to the press; and in nearly every case they were reproduced in full or copious extracts were inserted with comments of general or local application. Of the seven bulletins, there were distributed altogether 106,080 copies. They have been sent free to all applicants. When requested by them, the names of farmers and others interested in agriculture are put on the permanent mailing list to receive future publications as they are issued.

The bulletins have been :—

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## No. 1—MILK FOR CHEESE FACTORIES.

### FEED.

The milk of cows is a secretion or direct elaboration from their blood. Whatever interferes with the health and comfort of the animals will also affect the quality and quantity of their milk. Too much care cannot be exercised in providing feed that is cheap, succulent, easily digestible, wholesome and nutritious. The grass of early summer is too watery and weak in feeding substance to be fed alone to the greatest advantage. A judicious allowance of bran, pease and oats, oil-cake or cotton-seed meal will increase the milk supply and fortify the cow's system for the production of a larger quantity of milk during mid-summer, fall and winter. Broadcast fodder-corn, does not meet the needs of milking cows. A soiling crop of some sort or sorts should be grown, to furnish plenty of green fodder at the time when pasture may be bare from prolonged dry weather. Indian corn when grown under conditions favorable to its attainment of mature size and quality,—in rows or hills 3 feet or 3½ feet apart with from 2 to 6 seeds per foot in the row,—yields a fodder by the use of which cows are enabled to produce the largest amount of milk, butter or cheese per acre of land required for their support. Fodder corn is not a complete ration for the most economical production of the best milk. When it is supplemented by grass, bran, oil-cake, cotton-seed meal, or similar feeds, better returns for the feed consumed are realized than when it is made the exclusive diet.

### WATER.

Water is nature's vehicle for carrying about most of the matter which she requires to move from place to place. The great boulders were quietly clasped in her arms and without apparent effort brought from the northern ridges to the southern parts of our Dominion. The tiniest specks of nourishing matter needed to replace the worn-out tissues of the body are likewise carried to their proper places in this wonderful omnibus. The identical water swallowed by a cow to serve as a carrying medium in her blood, for the equitable distribution of the elements of nutrition throughout her whole body, is made to serve a like function in the milk which she yields. If that water be impure in the first place, it is likely to carry the impurity with it throughout its whole mission, from the drinking by the cow until after its consumption by the creature which consumes the cows product. Water which has been contaminated by decaying animal matter is specially likely to retain its pollution. The milk from the cows which drink such water is a menace and danger to the public health, and interferes greatly with the commercial value of all dairy products. There should be an abundant supply of pure water, easily accessible by the cows during hot weather. It should be furnished at a comfortable temperature during the cold weather of winter. Cows which are denied access to abundance of water, will not give as much milk, or milk of as good quality, as when plenty of water is provided with wholesome satisfying feed.

### SALT.

Dairy cattle should have access to salt every day, and salt should be added to all their stable feed daily. The conclusions from a series of experiments carried on in 1886 indicate that when cows are denied salt for a period of even one week, they will yield from 14½ to 17½ per cent. less milk, and that of an inferior quality. Such milk will on the average turn sour in 24 hours less time, than milk drawn from the same or similar cows which obtain a due allowance of salt, all other conditions of treatment being equal. This may apply with aptness to only the parts of the Dominion

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remote from the sea. From Quebec westward, as far as the Rocky Mountains, cows will consume an average of 4 oz. of salt per day, while they are milking during the summer.

### SHELTER.

Comfortable quarters are indispensable to the health and well-being of cows. Stables during the winter should have a temperature constantly within the range of from 40° to 55° Fahr. In summer time a shade should be provided in the pasture fields, or adjacent thereto, to protect against the exhausting influence of July and August suns. In all the management of cows such conditions should be provided and such care given as will insure excellent health and apparent contentment.

### MILKING.

When practicable the milking of each cow should be done by the same person, and with regularity as to time. He only that hath clean hands should be allowed to milk a cow. I say "he" because I think the men of the farm should do most of the milking, at least during the winter months. It is no more difficult to milk with dry hands than with wet. It is certainly more cleanly, and leaves the milk in a much more desirable condition for table use or manufacture. A pure atmosphere in the stables is indispensable to prevent contamination from that source. Immediate straining will remove impurities which otherwise might be dissolved to the permanent injury of the whole product.

### AERATION.

After the straining is attended to, the milk should be aerated. Too often it is poured into one large can and left there just as the cows had given it. That neglect implies three things that are very injurious to its quality for cheese making. (1) The peculiar odour which the cow imparts to the milk will be left in it until it becomes fixed in its flavour. (2) The germs of fermentation that come in the milk and from the air have the best conditions for growth and action when the milk is left undisturbed. (3) The milk will become in a degree unfit for perfect coagulation by rennet. Hence it is needful and advantageous to aerate it for three reasons:—

First, because by pouring, stirring, dipping or by trickling it over an exposed surface, there is eliminated from the milk by evaporation any objectionable volatile element that may be in it.

Secondly, because as has already been stated, the milk contains germs of fermentation. A strange peculiarity about some of these microbes is that they become active only in the absence of free oxygen. When warm new milk is left undisturbed, carbonic acid gas is generated, and that furnishes the best condition for the commencement of action by these almost invisible creatures. After they get started, they can keep up their decomposing work, even in the presence of oxygen. It is impracticable to perfectly coagulate such milk so as to yield a fine quality of keeping cheese. Coagulation by the use of rennet, of milk that is ripe can never be perfect, unless it be thoroughly aerated immediately after it is taken from the cow. *Neglect of aeration will increase the quantity of milk required to make a pound of fine cheese.*

Thirdly, because the airing seems to give vigour to the germs of fermentation that will bring about an acid condition of the milk, without producing the acid. So much is this so that *it has been found impracticable to make strictly first-class Cheddar cheese from milk that has not been aerated.*

### COOLING.

The subsequent cooling of milk retards the process by which it becomes sour. Certain germs of fermentation exist in milk which in the act of their multiplication, split molecules of sugar of milk, each into four molecules of lactic acid. By delaying the operation of these germs the milk is kept sweet for a longer period. The

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cooling of the milk should never precede the aeration. A temperature of from 60° to 70° Fahr. will be found cold enough for the keeping of milk over night, when it has been previously aired.

### PROTECTION.

Milk is a liquid of absorbent proclivities. It should be protected against injury that would result from exposure to impure air. A general purpose milk-stand is a device specially adapted for the spoiling of milk in that way. Such a stand serves as a milk stand and also a carriage stand, both of which are legitimate uses. Sometimes it is also occupied as a bivouac for swine for the convenience of these animals, the end of whose whey trough furnishes one step for the stand. Both of these latter extensions of its uses and hospitalities are all wrong.

### HONEST MILK.

The employment of inspectors promises to improve the quality of the milk furnished by some patrons, whose highest moral aspiration is limited by an effort to keep the self-appointed commandment, "Thou shalt not be found out." The adulteration of milk by the addition of water, the removal of any portion of the cream or the keeping back of any part of the strippings is forbidden by the Dominion statutes. Any person who is found out so doing, will not escape lightly. The inspectors appointed by the Dairymen's Associations have been equipped with suitable and competent testing instruments and have been instructed to render every assistance to cheese-makers, looking forward to the prevention of adulteration and the conviction and punishment of those who may be found guilty of the practice.

### MATTERS MOST NEEDFUL OF CARE.

In the following short paragraphs I have ventured to gather helpful advice on the matters most needful of care :—

1. Milk from cows in good health and apparent contentment only should be used.
2. Until after the eighth milking, it should not be offered to a cheese factory.
3. An abundant supply of cheap, succulent, easily digestible, wholesome, nutritious feed should be provided.
4. Pure cold water should be allowed in quantities limited only by the cow's capacity and desire to drink.
5. A box or trough containing salt, to which the cows have access every day, is a requisite indispensable in the profitable keeping of cows.
6. Cows should be prohibited from drinking stagnant, impure water. The responsibility for the efficacy of that beneficial prohibition rests wholly with the individual farmer.
7. Wild leeks, and other weeds common in bush pastures, give an offensive odor and flavour to the milk of animals which eat them.
8. All the vessels used in the handling of milk should be cleaned thoroughly immediately after their use. A washing in tepid or cold water to which has been added a little soda, and a subsequent scalding with boiling water, will prepare them for *airing*, that they may remain perfectly sweet.
9. Cows should be milked *with dry hands*, and only after the udders have been washed or brushed clean.
10. Tin pails only should be used.
11. All milk should be strained *immediately* after it is drawn.
12. Milking should be done and milk should be kept only in a place where the surrounding air is pure. Otherwise the presence of the tainting odors will not be neglected by the milk.
13. All milk should be *aired* immediately after it has been strained. The treatment is equally beneficial to the evening and morning messes of milk.

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14. In warm weather, all milk should be cooled to the temperature of the atmosphere after it has been aired, but not before.

15. Milk is better for being kept over night in small quantities rather than in a large quantity in one vessel.

16. Milk-stands should be constructed to shade from the sun, the cans or vessels containing milk, as well as to shelter them from rains.

17. Only pure, clean, honest milk should be offered, Any deviation from that will not always go unpunished.

## No. 2—NOTES FOR CHEESE-MAKERS FOR MAY.

### FACTORIES AND THEIR SURROUNDINGS.

1. *The present*, not next week, will be the best time to see that all the drainage facilities of the factory are adequate and in good order.

2. Whey runs, spouts and tanks should be put into such order that leaking will be prevented.

3. If there be a leakage anywhere from floors, spouts or tanks, which is not immediately preventible, provision should be made at once for the drainage of the waste, if only by shallow open trenches. A liberal supply of lime and gypsum should be spread around such places. Don't fail to secure a barrel or two of each, *some time this month*, for use during the hot weather.

4. If the factory buildings are not painted and will not be painted, get them whitewashed this month. If you cannot get that done by the proprietors or managers, get permission and do the rest yourself. A whitewashed curing-room of imperfect construction can be kept 10 degrees cooler in summer than one not whitewashed. If the cheese become injured, through excess of heat, neither the buyers nor the patrons will whitewash your reputation then, whether the blame belongs to you or not.

5. Make the surroundings of the factory neat and tidy. Plant a few trees and a great many flowers.

6. While keeping the outside of the premises as creditable to your taste and neat habits as possible, make the inside to reflect still more your aversion to everything untidy and dirty. Give every part of the factory a thorough cleaning and keep it in a sweet state all summer.

7. Before the curing-room contains any cheese, fumigate it by burning some sulphur mixed in alcohol. That will help to prevent the growth of mould on the outside of the cheese.

8. The leisure hours of May, before the large flow of milk is received, should be employed putting all the apparatus, appliances, utensils and machinery into the best of working order.

9. Be sure that the making room floor is so well constructed and supported that it will not shake or vibrate *during* the coagulation of the milk.

### MILK AND MAKING.

1. Procure a copy of "Milk for Cheese Factories" for each of your patrons by applying to the Dairy Commissioner, Central Experimental Farm, Ottawa, stating the number required and the address to which they are to be sent. They will be furnished free in French and English.

2. Look out for "leeky" flavors in the milk. Don't put such milk into the vat with that of the other patrons. If you have time make it up by itself, and send the cheese from it to the patron who supplied that milk for his private use.

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3. Make provision for keeping a short record of each day's work, of the exceptional treatment of every vat and of the comparative quality of the cheese from each vat, before they are shipped.

4. Milk sours *readily and rapidly* for a number of weeks after the period of lactation in the cows begins. Hence milk seldom requires to be ripened for setting, during May.

5. Use enough rennet to coagulate the curd into a state fit for cutting, in from 17 to 20 minutes, at from 82° to 88° Fahr.

6. Cut it rather early, slowly and very carefully.

7. Use the horizontal knife first.

8. Afterwards allow the curd to settle until whey comes over nearly the whole surface.

9. Then begin to cut with the perpendicular knife.

10. Immediately after the cutting is completed, begin to stir the mass slowly and continuously until the curd is cooked.

11. Heat should not be applied until 10 minutes after the stirring is begun.

12. The heating should be effected gradually, at the rate of about 1 degree for every 4 or 5 minutes until 98° Fahr. is reached.

13. Draw most of the whey early, and so guard against being caught unprepared for the rapid development of acid.

14. Don't dip the curd until the presence of acid is discernible by the hot iron test. Sweety flavors result from too early dipping in May.

15. After dipping the curd, stir it gently and keep it at a temperature above 94°.

16. Don't attempt close matting, high piling or packing of the curd this month. See that the whey is separated from it.

17. When it begins to feel "slippy" and smells like fresh made butter, it should be put through the cutter or grinder.

18. Acid develops so rapidly that care must be taken to keep the treatment well in advance of the change in the curd.

19. After grinding or cutting, stir for 10 or 15 minutes before salting.

20. Apply salt at a rate of about 1½ lb., early in the month, to 2 lb. per 1,000 lb. of milk during the last ten days, varying the quantity slightly according to the condition of the curd as to its moisture.

21. Begin to put the curd in the hoops within 20 minutes after the salt is stirred in.

22. Use only pure water in bandaging.

23. Guard against the formation of edges or shoulders from the hoop-followers being too small. Apply the pressure gradually until the whole power through the long lever is used, after four hours.

24. Leave the press-cloths on, and turn the cheese in the hoops every morning. Let no cheese leave the press-room until the shape is symmetrical and the finish neat.

25. Don't press the scaleboards on the ends of the cheese.

26. When the press-cloths are removed, use hot clean whey-oil or butter, into which has been dissolved a teaspoonful of soda per cupful of oil.

27. Try to keep the temperature of the press-room above 60° Fahr.

28. The curing room should be kept at a temperature continuously between 65° and 70° Fahr.

29. Provide strong, smooth boxes of the exact size.

30. Stencil the weight of the cheese in neat figures on the side of every box.

## Patrons.

1. Try to get each patron to take a personal interest in the care of the milk.

2. Encourage every farmer in your neighborhood to sow a small area of oats and pease or oats and vetches for summer supplementary feed.



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3. Persistently endeavor to induce every patron to plant at least five acres of fodder corn in rows three feet or three and a half feet apart.

4. Send to the Dairy Commissioner, Central Experimental Farm, Ottawa, for a bulletin of instructions on the planting of fodder corn, the construction of silos and the curing of silage.

——:o:——

Every person who fills up the form on the attached sheet and returns it to the Dairy Commissioner, Ottawa, will thereafter receive the Monthly Dairy Bulletins, as they are issued.

*Name of Cheese Factory*.....
*In the Township of*.....
*In the County of*.....
*In the Province of*.....
*Nearest Railway Station*.....

*Name of Proprietor*.....
*P. O. Address*.....

*Name of the Salesman*.....
*P. O. Address*.....

*Name of the Cheesemaker*.....
*P. O. Address*.....

## No. 3—BUTTER-MAKING.

### Fat Globules in Milk.

While her milk is being elaborated by a cow, the ends of the cells which line the inside of the milk-ducts and vesicles in her udder, seem to enlarge. Each one forms a small globule, and when that is perfected it drops off into the serum of the milk. Each bud or globule, so formed, is a globule of fat; from them is made all the butter from cows' milk. These tiny buds of fat seem to grow on the surface of the cells, partly by the destruction of the cells, and partly by conversion of some of the substance of the blood into fat. They trickle down in and with the milk, and are held in suspension not in solution as are the other solids in it. They mostly come during the latter part of the milking, probably because they do not move so quickly or easily as the liquid part of the milk. The fore-milk is thinner than the strippings, because the globules of fat do not free themselves from the internal linings of the milk ducts so quickly as the liquid of the milk. If one finds, sending milk to a cheese factory, a man who is of so modest and retiring a disposition that he will not keep at home for table use a quantity of the average milk given by the cow, but always and only the last quart, his modesty should not be respected or trusted too far; such modesty may not be found compatible with honesty. The condition of the cow's blood and her nervous system very largely affect the quality of the milk she gives. Bad feeding, foul water or the absence of salt will induce in the cow a condition in which she will not yield good milk; a similar condition with its consequent effects, may be caused by neglect, exposure, abuse or excitement. A cow has a peculiarly delicate organisation, and must be handled with kindness, and any man who abuses a cow beats out the profit, for she will pay him back by giving less milk, and that of a poorer quality. The globules of fat before mentioned, are so

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numerous that in a thimbleful of milk there will be found millions of them. It is estimated that there are at least one thousand millions of them in every cubic inch of milk. From these specks of fat the butter is made.

### CREAM SEPARATION.

To get them out of the milk is the task of the butter-maker; they are too small to be strained out with the finest sieve; fifteen hundred of the largest of them placed side by side, like a row of marbles, would not measure more than one inch. If milk be left at rest they will rise to the top because they are lighter than the liquid in which they float. The heavier parts of the milk are drawn down by force of gravitation, and as the serum of the milk, composed of water, casein, sugar, albumen, etc., moves downward, it displaces the cream globules and forces them towards the top. There are two methods of separating these fat globules from the milk; a natural method and a mechanical method. In the natural method, the power of gravitation is used to pull the heavier portion of the milk down, with the effect that the lighter part, the fat globules are pushed upward. In the mechanical method, centrifugal force is applied to attain a like result. When a quantity of milk is put into a rapidly revolving vessel or cylinder, the heavier parts will be forced outwards against its resisting side or inner surface with sufficient pressure to push the lighter particles, the globules of fat, towards the centre of revolution. In that way the water, casein, albumen and the other heavier constituents of milk, find their way to the outside of the quantity being treated in a revolving cylinder, while the globules of fat are collected in concentric form on the inside surface of the quantity being treated. This is the law, that the cream, mainly composed of fat globules, travels in a direction opposite to that of the force exerted upon the milk whether the force be centrifugal or centripetal.

### EFFECT OF TEMPERATURE.

If ordinary milk in a deep-setting pail be left at a temperature of 60° Fahr., it would take these small specks from three to six days to get to the top at the rate at which they would move. They can be helped to move faster. The milk at a temperature between 90° and 98° is slightly enlarged in bulk, and by putting it into deep-setting pails at a higher temperature (90° to 98°), the advantage of a falling temperature from above 90° to 40° or 45° may be gained. That treatment will expedite and facilitate the upward movement of the globules of fat. The rapid cooling of the milk is also believed to prevent the formation of a delicate mesh of lacto-fibrine in the milk, which would hinder the globules from rising freely.

### CREAM.

The cream itself is only that part of the milk into which the globules of fat have been gathered in large numbers. Cream has no regular or constant per cent. of fat; the range is from 8 per cent. to 75 per cent. In one hundred pounds of cream there may be only eight pounds of butter, or there may be seventy-five pounds according to its quality of richness. The globules of fat have no skin or organic coverings distinct in constitution from their own substance. Like drops of quicksilver that have separated from each other, they have no pellicle. But sometimes the serum of the milk becomes so viscous that a quantity of it will adhere to the surface of the globules and like a coating of gum will prevent their movement upwards when the milk is set, or their movement inward when the milk is treated in a centrifugal machine. If a quart of warm water be stirred into every pailful of milk when it reaches the dairy room from the stable, the separation of the cream will be facilitated. The water may be at a temperature anywhere between 150° and 180° Fahr., and should be warm enough to raise the temperature of the milk to above 90°.



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### CHURNING.

In the winter season especially, difficulty is experienced sometimes in churning the cream. The addition of water at a temperature of 70° to the cream, while it is still sweet, to the extent of 25 per cent. of its bulk, will cause it to yield its butter in less time and more completely. The water should be added before the cream is sour and at least 20 hours before the churning is commenced. The next treatment required is the development of lactic acid. If a quantity of *sweet cream* be churned and an equal quantity of *sour cream* of the same quality as to composition be also churned, there will be obtained on the average from the sweet cream only 77 pounds of butter out of every possible 100 pounds, while there may be obtained from the sour cream 97 pounds of every possible 100 pounds. There are thousands of pounds of butter lost in the Dominion annually from the churning of two qualities of cream in the same churn at one churning. The only safe plan is to have all the cream for each churning thoroughly mixed from twelve to twenty hours before the operation begins. It should be kept at a temperature of from 60° to 70° Fahr. according to the season of the year, to permit it to become sour. The higher temperature is required during the winter season and for cream from centrifugal separators during the summer season also. The churning is performed for the purpose of causing the globules of fat to strike on to each other and by impaction to unite. If two globules strike each other at a suitable temperature they will stick together; when large numbers of them unite in that way, it is said that the butter has, "come," and the particles may be washed and removed. All that is required in the churning of cream is that the serum or medium shall be properly treated: (1) by the addition of water if required, as already described, (2) by the development of acid, (3) by the temperature being kept at from 57° to 59° in the summer time or from 62° to 66° in winter. It is imperative that a thermometer should be used to reveal the temperature.

### GRANULAR BUTTER.

When the butter particles are half as large as clover seed, 10 per cent. of cold water may be added to the contents of the churn. After they are gathered to be half as large as wheat grains, the churning may be stopped. The buttermilk may be removed and replaced by pure water at a temperature of from 50° to 55° Fahr. It may thus be washed in the granular state. When the water runs off free from a milky appearance, the granular butter should be left in the churn for half an hour to drain.

### SALTING.

It may then be salted in the churn or removed to the butter worker for that purpose. Pure salt of fine velvety grain only should be used. The rate of salting should be regulated to suit the taste and requirements of the customers. From three-quarters of an ounce to one ounce per pound will be found acceptable to most of those who purchase Canadian butter. The preparation for the market should be made with a view to giving the butter an attractive appearance, whether it be packed in tubs or firkins, or finished in prints or rolls.

At the risk of repeating a little of what has been already presented, I have gathered into paragraphs some further hints and advice, which may be helpful in attaining the end that is being sought, viz: the improvement of butter and the butter trade.

### PREPARATION OF MILK FOR CREAMERIES.

1. See that the cows have an abundant supply of good wholesome feed. Supplement the grass with bran or grain. Corn and pease make firm butter. If grass be dry or scarce furnish green fodder. The quality of the feed determines to some extent the quality of the fat globules in the milk. Fine butter is mostly composed of these. Green fodder is fed with better effect on the quality of the butter, after being wilted for a day or two.

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2. See that the cows have a liberal supply of pure cold water. As well might a cook expect to make good palatable porridge out of musty oatmeal and stagnant water as to get pure, sweet-flavored, wholesome milk out of musty feed and foul drink consumed by a cow.

3. See that the cows have access to salt every day. They know best when to help themselves.

4. Let the cows be saved from annoyance and worry. Any harsh treatment that excites a cow lessens the quantity and injures the quality of her yield.

5. Where practicable let the cows be milked regularly as to time and by the same person.

6. The udders should be well brushed and then rubbed with a coarse towel before milking.

7. All milk should be carefully strained immediately after the milking is completed.

8. Thorough airing of the milk for a few minutes by dipping, pouring or stirring will improve the flavor of the butter.

9. When set for the rising of the cream, milk should be at a temperature above 90° Fahr.

10. When deep-setting pails are used, the water in the tank should be kept below or as near 45° Fahr. as possible.

11. The tank should be shaded from the sun.

12. When a flowing spring is not available, the cooling power of the fresh water may be used more economically, if it be carried to the bottom of the tank and the warmed water be caused to run off from the top. If water be scarce, the overflow may be carried into a watering-trough for the stock of the farm.

15. Milk cans should be washed in cold or tepid water first, and then rinsed in boiling water before they are exposed to be aired. The addition of a little soda and borax to the hot water will increase its cleansing properties.

### QUALITIES OF CREAM.

14. Since managers of creameries have adopted the plan of paying for cream according to its butter-making qualities, some dissatisfaction has been caused among the patrons by the differences which comparisons have made evident. In most cases, the trouble arises from an erroneous idea that the richest cream is the best for butter-making and the most profitable to the patron. It is not the patron who supplies the cream which yields the greatest number of ounces of butter per inch, who always obtains the largest returns from the milk which has been set. Milk which has been set in deep pails at a high temperature and has not been cooled below 60° Fahr., will yield a cream very rich in butter-making quality; but there will be a smaller quantity of cream obtained from the milk and a less quantity of butter, than where the milk is cooled as low as 45° Fahr. The longer the time cream stands on milk after practically all of it has come to the top, the less space it will occupy. As it shrinks in bulk it becomes richer per inch, but the total quantity of cream from the milk will not yield any more butter than it would have made before it became compact by long standing. (A creamery inch of cream is equal to 113 cubic inches or to one inch in depth of a cylindrical vessel, 12 inches in diameter.) When the milk is skimmed every 12 hours, the cream will not yield as many ounces of butter per inch as when it has been set for 24 hours or longer, but the extra quantity of cream that may be obtained by 12 hours setting in ice water will permit as much of butter to be made from the milk as by setting it for a longer period.

15. Skimming should not be delayed longer than 24 hours after the milk is set. Cream should be removed from the milk before it is sour. Its value to a creamery for butter-making depends not alone upon its richness in butter-fat; purity, sweetness and fine flavor are qualities it should possess.

### THE OIL-TEST CHURN.

16. The oil-test churn is used to determine the quantity of churnable fat in each supply of every patron's cream. The requirements for its successful use are:—

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(*a*). Careful sampling of the cream, which should be poured at least twice from one vessel to another before the sample is taken for the test tubes;

(*b*). Accurate measuring;

(*c*). Souring of the cream ;—(to ensure a uniform degree of acidity in all the samples of cream, they should be warmed to 70° Fahr. and kept at that temperature for 24 hours before they are churned);

(*d*). Heating of the samples to a temperature of 135 degrees Fahr. after they have been churned;

(*e*). Subsequent cooling to 65° or 70° Fahr.;

(*f*). Churning, reheating and cooling.

17. In a case where the butter-oil on any sample does not separate to show a clear line of demarcation between itself and the other constituents of the cream, the cooling to 70°, the churning and reheating should be repeated.

BUTTER-MAKING IN DAIRIES AND CREAMERIES.

18. When the shallow open pans are used for setting, the surrounding air should be pure ; a damp, musty cellar is no fit place for milk.

19. The cream far each churning should all be gathered into one vessel and kept cool and sweet. A good practice for fall and winter is to mix 25 per cent. of pure water with the cream before it has become sour.

20. The whole of it should be well stirred every time fresh cream is added and half-a-dozen times a day besides.

21. Two days before the churning is to be done, about one quart of cream for every four pailfuls to be churned—(or a quantity equal to two per cent.)—should be set apart and kept as warm as 70° Fahr.

22. One day before the churning, that small quantity of cream, called a fermentation starter, which will then be sour, should be added to the quantity which is intended for churning and be mixed therewith.

23. It should afterwards be kept at a temperature of 60° Fahr.

24. During summer the best churning temperature is 57° or 58°; during the late fall and winter 62° to 64° are found to be preferable.

25. The agitation of churning should be kept up till the butter comes into particles larger than clover seed.

26. The buttermilk should then be drawn off and pure water at 55° added in its place.

27. By churning this for a minute or two the butter will be washed free from milk while it is still in a granular state.

28. The milky water may then be drawn off and replaced by a weak brine at the same temperature.

29. After a minute's churning, the butter may be left to drain in the churn for half an hour before it is removed to be pressed and salted.

30. Pure salt of medium fineness and with a body velvety to the touch should be used.

31. Three-quarters of an ounce to the pound will be the right quantity for most markets for immediate consumption, and one ounce to the pound for packed butter.

32. The butter should be kept cool during the working and also during the few hours while it may be left for the salt to dissolve.

33. As soon as the salt is dissolved, the butter may be worked the second time to correct any streakiness which the first mixing of salt may have caused.

34. It should then be put up neatly and tastefully with as little crimping and beautifying as feminine fondness for these will permit.

## STORE-BUTTER.

I venture to add a few hints to the merchants who take butter in trade at stores in towns and villages. I wish to be understood, not as writing anything that will encourage the practice of packing store-butter, but as trying to contribute a little to

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the lessening of the losses which will continue to result from that method of handling it.

ROLL-BUTTER.

1. Butter is susceptible to odors or flavors in the surrounding air; it should be kept in a place where the air is pure.

2. If it is to be forwarded to the consumers' market in rolls, it should be handled as little as possible; every handling adds "mussiness" to the appearance and consequently depreciates its value.

3. Each roll should be wrapped in a clean butter-cloth, which has been soaked in a strong brine made up from 16 parts of salt and 1 part each of white-sugar, saltpetre and borax, dissolved in water.

PACKING BUTTER.

4. Butter which is being collected for packing may be kept in fair condition in a clean box; a better plan is to have it immersed in pure, strong brine.

5. In assorting it, more regard should be paid to similarity of body and flavor than to likeness in the shade of color.

6. The mixing table, or butter-worker needs to be kept particularly clean; after it has been thoroughly washed with borax water, it should be scalded and then cooled with cold water.

7. The butter should be worked at a temperature which will prevent it from becoming greasy. The temperature at which it is worked or mixed has more effect on the grain and body of the butter than the movements to which it is subjected can have. The cool atmosphere of early morning and a supply of cold water in which to float the butter will meet the needs of the case.

8. Only such packages as have a clean, neat appearance should be used.

9. The top of the butter should be covered with a clean butter-cloth, prepared in the same way as that for the wrapping of roll-butter.

10. A covering plaster made of wet salt should be put over the cloth, to a thickness of half an inch or more.

11. Butter in tubs and kegs should be brined frequently; the salt-covering should not be allowed to become quite dry; a brine similar to that which has been mentioned for use on butter-cloths, may be used freely with good results.

## No. 4—FODDER CORN AND THE SILO.

In olden times when it was counted a more noble achievement to destroy human lives than to make provision for their sustenance and comfort by providing an abundance of wholesome food and convenient clothing, the leaders were accustomed to stimulate the people to prepare for success in their barbarous and deplorable line of endeavour, by urging the prudence of the common maxim,—"In times of peace prepare for war." Farmers in Canada to-day need to be stirred up by some means, to prepare and equip themselves for winning success in their nobler line of effort, during the years of keen conflict and productive competition that are now coming upon them. A mistaken judgment on the cause of hard times has led some men of narrow vision to attribute their occurrence and recurrence to over-production. The over-production of certain articles of general use may, for a time, cause stagnation in the manufacturing industry concerned in furnishing them. In the nature of things, that stagnation must react to some degree upon all other industries and the general community; but an over-production of good food is a blessing by which the world has

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not yet been grievously afflicted. To provide food of excellent quality in abundance, at such a low cost for labor expended in its production, that it will be within the easy reach of the poor as well as the rich, must be the object and work of farmers in coming years.

The people's food may be classed as of two sorts,—food from plant or animal sources. The latter must necessarily come originally from the former. Hence, whatever system of farming, or kind of cropping, or sort of animal husbandry, will enable the farmer to provide the largest quantity of suitable food for the community, with the least expenditure of labor, will be for the general benefit of the whole people. However, the work must be followed and performed with good judgment and skill. Because the growth of *Fodder Corn* and the use of the *Silo* will help the farmers to do better for themselves and the whole community, of which in our country they form the most important part numerically and otherwise, I desire to urge again upon their attention the growth of corn and the construction of silos. No subject closely related to agriculture is receiving so much attention from the agricultural press as that of ensilage; and the growth of fodder corn and its serviceability in the form of ensilage are being discussed by the farmers with a zest and thoughtful interest that do not arise from the novelty of the name or curiosity about the process whereby it is made.

### THE CORN CROP.

In our Dominion, the corn crop is recognised as by far the most suitable one that can be grown for the making of ensilage. A few of the possibilities of service from its growth may be enumerated:—

1. The hay and straw crops have been factors so important for the economical wintering of cattle, and if they happened to be light and short, a scarcity of cheap feed has been experienced. A part of a corn crop may be planted so late that the farmer can accommodate the acreage to the prospects of a large or light hay crop, an estimate of which may be made with reasonable accuracy by the middle of June in most years.

2. Two alternatives present themselves to the farmer who depends entirely upon pasture for his cattle during the summer months. He must either stock his fields lighter than their capacity can well support during June and early July, or let the cattle suffer from insufficient herbage from which to bite during the hot and dry weather of mid-summer. The system of partial soiling enables the farmer to stock his pasture fields during June to the utmost limit of their supporting power. Green fodder may be grown to carry them over a period of scant feed from pasture fields. While rye, clover, pease and vetches, and pease and oats are admirably adapted for such uses, they give but a small yield per acre compared with what may be obtained from a corn crop.

3. A cheap winter fodder for cattle is indispensable to the dairyman and cattle feeder who farms for profit in these times of comparatively low prices and keen competition. Cattle can be fed upon fodder corn from a silo at a cost at least one-half less per head per day, than when hay is the main ration. That statement will apply to almost every part of the Dominion, In seasons which yield but a light hay or short straw crop, corn grows most luxuriantly. Hence, it has a special complementary-crop value where large numbers of cattle are to be fed during the winter and summer.

4. From the large quantity that may be obtained from a small area of land, the corn crop will enable the small farmer to engage successfully in animal husbandry. On 50 acres of good arable land a farmer, by a rotation of crops and the growth of 10 acres of fodder corn, may profitably feed 25 head of thrifty cattle the year round, besides the ordinary complement of young stock. The number may be gradually increased as he is enabled from their droppings to enrich the soil, for the growth of heavier crops and larger areas of fodder corn.

5. The summer cultivation of the soil during the growth of the crop has a very beneficial action upon its fertility. The long roots of the plant loosen the soil, and

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by their action and decay liberate some of the constituents required for the growth of succeeding crops. They also provide for the freeing of the land from obnoxious weeds and the preventing of them from obtaining a new roothold.

### INDIAN CORN.

This plant, which is now cultivated in every part of the globe, is believed to have come originally from South America. Its first introduction into Europe is supposed to have been from this continent by the ships and hands of the adventurous Norseman a long time before the voyages of Columbus. From Mediterranean ports it was scattered through Europe; and as everything foreign to home civilization in these days was called "Turkish," the name "Turkish Corn" clings to it still in many of the countries there. Reference is made in the early annals of the settlement of this continent to cultivated corn fields about the mouth of the Kennebec River, in Maine, in 1605.

In 1535 Cartier found waving corn fields at Hochelaga under the care of the Indians, near the site of what is now Montreal. It is an agricultural product which has been of great service and value to the farmers on this continent; and its enormous yields per acre, without apparent serious exhaustion of the fertility of the soil, have made it a means whereby the districts and countries where it has been grown successfully and extensively have become enriched rapidly. Contrary to the belief of many farmers in Canada, it can be grown to advantage for fodder purposes in every Province of the Dominion. In those counties in Ontario where it has been valued for its grain-producing qualities, the average yield per acre in 1888 was 78·2 bushels in the ear, against a yield of 26·3 bushels of shelled corn, as officially stated for the corn-growing States. With this crop, as with the more commonly grown cereals, the several varieties obtain their maximum of service and value in the most northernly limits within which they can be grown to maturity. However, its main service to the farmers of Canada will arise from its value as a fodder rather than as a grain crop.

The numerous varieties of it are due to climatic conditions, selection, cross-fertilisation, cultivation and soil. Attention to the controllable treatment will doubtless enable those in charge of the Experimental Farms of the Dominion to discover and develop some varieties more suitable and serviceable to us than any that are yet well known. The height attained by the plants of different varieties range from 2 to 16 feet. The one leaf carried on each joint varies in size, and the nodes or joints on the stalks vary in number. Ears may be produced at any joint. Sometimes 2 or 3 are carried on one node, and occasionally as many as 10 ears are formed on one stalk. In the climate of our Dominion, varieties that carry more than 2 or 3 ears per stalk have not been ripened successfully. The number of rows of kernels on each cob may be evenly divided by 2. They range from 8 up to 36 rows. The kernels of the several varieties differ very much from each other in shape, size, quality or color. Seventy-one varieties were grown on the plots of the Central Experimental Farm, Ottawa, last season.

### GROWING THE CROP.

In Canada *the corn crop* is unquestionably the most suitable for ensilage uses. The manner in which the crop is grown determines to a great extent the possibility of its being cured with success and certainty. It should be grown to a stage near maturity. Then the several plants will have attained the largest amount of nourishing substance for the feeding of cattle, and will be capable also of long preservation without waste or loss. The feeding value per acre is greatest when the crop is almost matured when cut. The conditions essential to enable the plants to reach that stage of growth in our Dominion are:—(1) Early Planting; (2) Suitable Varieties; (3) Thin Seeding; and (4) Frequent Cultivation.

1. *Early Planting.*—Although a loose warm soil is known to be best adapted for its growth, large crops can be obtained from clay lands as well as from sandy

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soils. The land should be drained either naturally or by artificial under-drainage. It should be worked into a fine seed-bed. To attain that, I recommend for most soils, deep fall ploughing and thorough surface cultivation in the spring. If the land is foul with weeds, a surface cultivation at two intervals of 10 days each will give the weeds a chance to start, when they may be again destroyed by the cultivation preparatory to the planting of the corn. In that way the young corn plants may obtain a good start on fairly clean soil. The labour of keeping the field clean during the summer will be very much lessened by such a treatment in the spring. The planting in the several districts should be late enough to miss the late spring frosts and early enough to obtain the full value of the growing season. Early planting should be shallow, that the sun may warm the seed-bed and so prevent the seed from rotting in the ground; later planting may, with advantage, be deeper to insure sufficiency of moisture for germination. A liberal quantity of barnyard manure worked into the soil will be applied profitably. Corn from a manured part of a field will be on an average from 2½ to 3 feet longer in the stalk, will tassel out from a week to 10 days earlier, and will carry a much larger proportion of ears to the stalks than on a part of the same field of similar soil where no manure has been applied.

2. *Suitable Varieties.*—Our information on this matter is yet very scant. It may be safely recommended that at least one-half of the acreage to be planted be seeded to some variety that will mature in the locality. The other half may be seeded with some of the larger growing varieties of ensilage corn, such as "Mammoth Southern Sweet," "Giant Prolific," "Sweet Ensilage," "Red Cob Ensilage," "Mammoth Sweet Ensilage." etc., etc. From examinations made and analyses conducted at the Ontario Agricultural College last year under my direction, it was learned that over 42 per cent. of the total dry matter and over 56 per cent. of the total crude protein were contained in the leaves of the plants, which had not then reached a stage beyond what is called "early milk." This would indicate that such varieties as are leafy in their growth will be rich in feeding constituents.

3. *Thin Seeding.*—It has been practically decided by the judgment of those who have had the longest and most successful experience that corn for ensilage should be grown in hills or rows. These should be from 3 to 3½ feet apart. In rows the seeding should not be thicker than 3 grains to the foot. When large white ensilage corn is grown, the seeds should be from 6 to 8 inches apart in the rows; three seeds to the hill is enough. A common force-feed seed drill may be used for the planting in rows, all the spouts except two being stopped up. One idle spout may be dragged in the soil to mark for the driver's guidance, in order that all the rows may be an equal distance apart.

4. *Frequent Cultivation.*—Level cultivation is preferable to "hilling up" or "moulding up." If the surface of the soil should become crusted, as soon as the corn appears 2 inches above the ground it should be harrowed over with light harrows. That treatment will keep down any growth of grass and destroy tender weeds. The harrowing may with advantage be repeated once or twice before the corn is more than 8 inches high. Frequent and shallow cultivation between the rows or hills afterwards will keep down weeds and promote growth. The cultivation should be continued as long as practicable, even until the stalks are higher than the man and the horses. When the lower leaves begin to turn yellow and the ears of the corn are in the milky stage, the crop should be cut.

### THE SILO.

The prejudice against the construction and use of silos is fast disappearing from the minds of observant farmers. The partial failures of some of the first efforts to introduce into this country the ensilage system of preserving fodders, originated a timidity and opposition which are now uncalled for. The causes of those failures are understood, and can be so guarded against, remedied or removed that satisfactory results may be obtained with certainty. In the handling of perishable commodities the damage and loss that may be sustained, will be proportionate to the absence of

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applied knowledge and skill. All rational and successful human effort is the result of some person's accurate observation and clear thinking. A clear knowledge of "how to do it" and the "doing of it" just that way will enable farmers, as well as other men, to cope successfully with the things most difficult to do well. The curing of a crop of fodder corn in the silo is now an easy and invariably satisfactory work to the farmer who follows right directions with reasonable prudence. It used to be stated that there was a loss in the feeding value of fodders when put into or taken from the silo. When the ensilage was partially decayed, of course that was the case; but a similar depreciation of quality and consequent loss in the feeding value would result if the hay, grain and straw were allowed to become rotten in the mows or granaries. The spoiling was and always is a result from unsuitable conditions or treatments. These the silo is intended to remove and guard against. Let me make clear the use of the new names. *A silo* is simply an air-tight building, box, tank, compartment or pit, into which fodders in a succulent state are put for curing and preservation. *Silage*, or, as it is sometimes written, *ensilage*, is the feeding substance after it has been so cured and preserved. Hence, we have corn *ensilage*, clover *ensilage*, oats and peas *ensilage*, etc.; etc.

### BUILDING A SILO.

If a silo be erected as a separate structure, its foundation may be a low stone or concrete wall, or durable sills treated with tar, or charred to prevent decay from contact with the soil. An earth floor will be cheapest and best. The immediate surroundings of the silo should be well drained, to prevent the entrance of water to its floor. The following cuts have been prepared to illustrate the method of construction.

Figure I. represents a section of an outside silo to be erected as a separate building.

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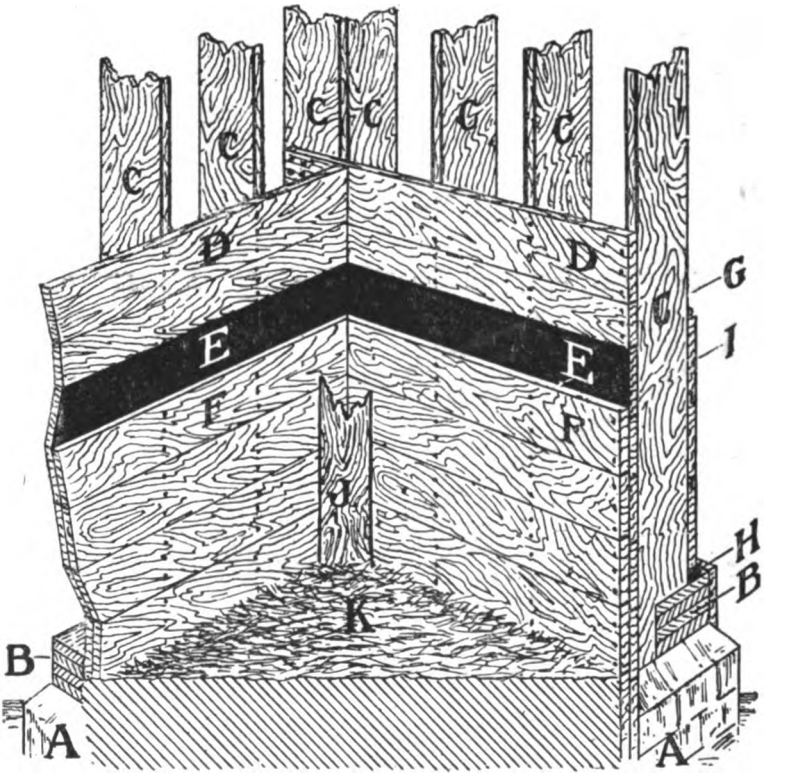
FIG. I.




A. *Foundation wall;* B, *Sills;* C, *Studs,* (2 inch x 10 inch or 2 inch x 12 inch, not more than 2 feet apart); D, *Lining of inch lumber dressed on one side;* E, *Sheeting of tar-paper;* F, *Lining of inch lumber dressed on one side;* G, *Tar-paper;* I, *Outside siding;* H, *Strip nailed behind heel of studs;* J, 1 *inch board* 10 *inches wide, across the inside corner of the silo and filled behind with sawdust;* K, *Cut straw on the floor of the silo.*

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Figure II. represents a section of an inside silo to be constructed inside a "bank barn."

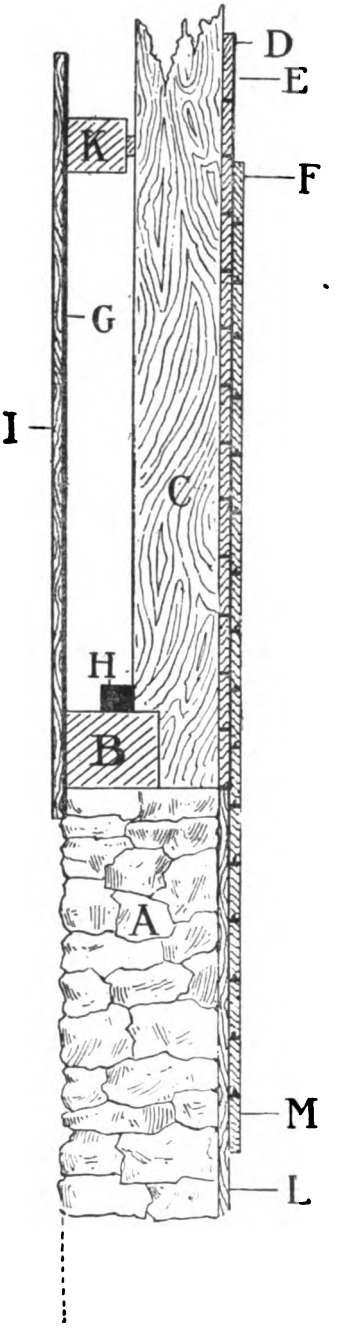


FIG. II.

A. *Stone wall of barn*; B, *Sill*; C, *stud of silo*; D, *Lining of inch lumber dressed on one side*; E, *Sheeting of tar-paper*; F, *Lining of inch lumber dressed on one side*; G, *Tar-paper on the inside of the siding of the barn*; H, *Strip behind the heel of the studs*; I, *Siding of the barn*; K, *Girt*; L, *Strips 1 inch thick by 4 inches wide, put up and down on the stone wall*; M, *Inch lumber, tongued and grooved.*

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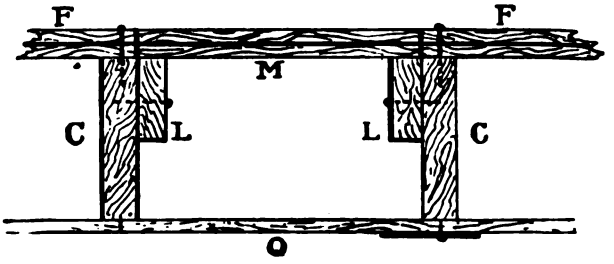
Fig. III. represents a simple method of constructing a door in a silo.

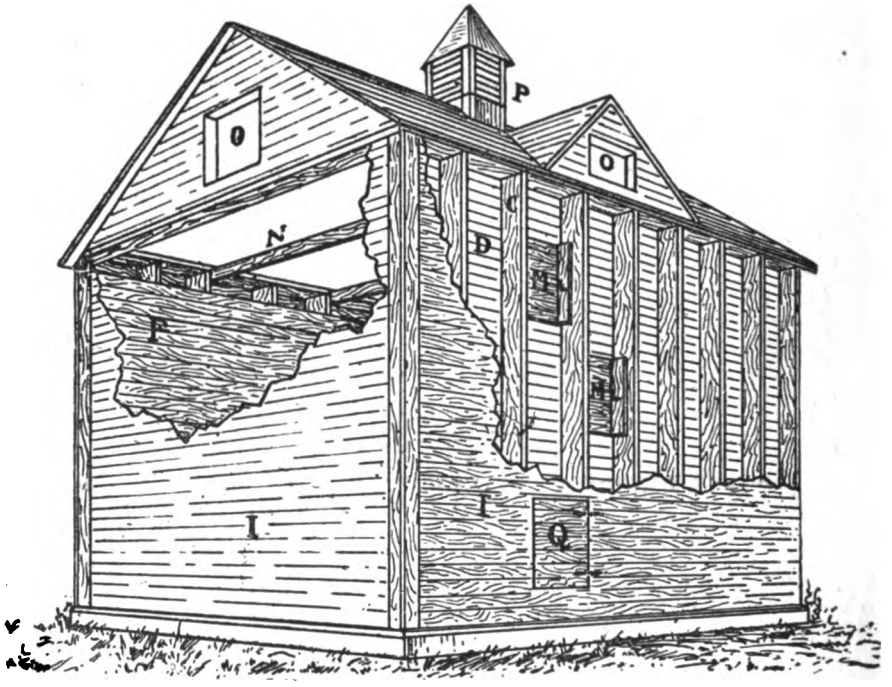
FIG. III.




C, C, *Studs;* F, M, *The two thicknesses of lumber with tar-paper between, on the inside of the silo, to be sawn through flush with the side of the studs;* L, L, *Cleats to be nailed on to the side of the studs;* Q, *Outside door in sections of* 3 *or* 4 *feet and on hinges.*

Fig. IV. represents an outside silo, erected as a separate building.

FIG. IV.




C, *Studs;* D, *Lining on the studs;* F, *Inside lining of the silo;* I, *Outside siding;* M, *Boards of the door to be taken off as the silo is emptied;* N, *Cross ties, to strengthen the building;* O, *Openings for the filling of the silo;* P, *Ventilator;* Q, *One of the outside doors, on hinges.*

To preserve the inside lumber, it should receive a coating of crude petroleum, which is much easier of application than coal tar, and seems to leave the ensilage in immediate contact with it in a good condition. I take the following from my last annual report as Professor of Dairy Husbandry at the Ontario Agricultural College, to show the effects on the ensilage from different styles of finishing the inside of a silo;—

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"The finish on the inside of the studs was different on each of the four sides of the silo.

"*On one side of the silo* a lining of inch lumber dressed on one side, was nailed on the studs; this was covered with a sheeting of tar-paper; on the tar-paper was put a lining of inch lumber dressed on one side, tongued and grooved.

"*On another side of the silo* the construction on the inside of the studs was similar, with only the difference that the inside lining of lumber was not tongued and grooved.

"*On the third side of the silo* the studs were lined on the inside with tar-paper; on that was nailed horizontally a sheeting of inch lumber, tongued and grooved and dressed on the side next the inside of the silo.

"*On the fourth side of the silo* the finish on the inside of the studs was made by the use of only one thickness of inch lumber, neither dressed nor tongued and grooved; it was nailed on the studs horizontally.

"The following concise statement may help to make the differences of inside finish, clear to the minds of the readers who have had no experience in silo building:—

*First side;* studs 2″×10″; inch lumber dressed on one side; tar-paper; inch lumber dressed on one side, tongued and grooved.

*Second side;* studs 2″×10″; inch lumber dressed on one side; tar-paper; inch lumber dressed on one side, but *not* tongued and grooved.

*Third side;* studs 2″×10″; tar-paper; inch lumber dressed on one side and tongued and grooved.

*Fourth side;* studs 2″×10″; inch lumber as it came from the saw."

"The lumber on all sides was put on horizontally. The purpose of the DIFFERENCES in the construction of the sides was to discover the cheapest way of building one that would preserve the silage.

"I may here anticipate by reporting that up to the time of writing, with the exception of a short distance from the top of the silage, there was practically no waste or spoiling against the *first*, *second* and *third* sides. Against the *fourth* side the silage was decayed or moulded for a space of from 4 to 6 inches in from the side, for the first 6 feet from the top of the ensilage; below that the waste was confined to a space of about 4 inches around the seam between each two boards."

From within 4 feet of the bottom of the silo there was no waste, even close to the seams. If air finds admission through a knot-hole, or crack, or down the sides, from neglect of tramping, or otherwise, after the ensilage is settled, it will carry spores with it and so cause mould and decay.

### FILLING A SILO.

Three conditions or treatments seem to be essential to the obtaining of the best quality of ensilage without appreciable waste from fermentation, moulding or decay:—

1. The plants should be grown to a stage almost mature;
2. They should be wilted in the sunlight until the water which they contain is less than 75 per cent. of the total weight;
3. The ensilage around the sides and in the corners of the silo should be tramped and packed thoroughly while it is being filled.

For the economical filling of a silo, the tools, implements and conveniences should, as far as possible, be adapted to the cheap and easy performance of the work. For the cutting of the corn I prefer and recommend a common corn knife or old-fashioned reaping sickle. A strong reaper may do the work by horse power; but if the crop be heavy and the corn from 10 to 12 feet high, the rakes will not clean the table and stalks will be dragged behind.

A truck or waggon with low wheels and a large platform may be used. A low platform may be put upon the running gear of a common waggon, by hanging the front of it to the under side of the front axle and attaching the back part of it to the under side of the back axle. A cheap and convenient platform for such work may

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be made by placing the ends of two poles 14 or 16 feet long on the front bolster of a common waggon and attaching the other ends of them to the under side of the hind axle by the use of a piece of stout rope. If boards be nailed across on these poles, between the front and hind wheels, the platform thus made may be easily loaded and can carry from one to two tons of stalks, if a stake be put in at each corner of it. After the corn is cut, it should be left to wilt for one or two days in small bunches on the ground. Iu may be filled into a silo without cutting; but more labour would be involved and the work of feeding would be rendered more difficult. Any strong corn or straw-cutter, with capacity for a large quantity per day, will serve the purpose. Carriers should be attached, unless the cutter stands on a level with the top of the silo, which ordinarily is neither practicable nor desirable. Horse power or an engine may be used. From 6 inches to a foot of cut or uncut straw should be spread over the bottom of the silo before the filling is commenced. At the silo, the corn can be fed into the cutter, directly from the waggon platform. The horses may meanwhile be changed from the loaded to an empty waggon. At the cutting box, two men will be required. A 2-inch cut is as good as a shorter one. During the filling, care should be taken to level the heavier parts of the stalk out against the sides of the silo occasionally. The filling may proceed every day, every second day, or every third day, as may be convenient. In any case, the contents should be tramped around the sides and in the corners before the addition of a new layer. Though the corn stalks may be wet from rain, they may be put into the silo without any damage from that cause.

### COVERING THE ENSILAGE.

When it is full, after the lapse of two days, the sides and corners should be thoroughly tramped again, after which the whole surface should be covered with a layer of from 2 to 3 feet deep of any kind of straw, cut or uncut. It should be packed closely around the sides and into the corners; and for that reason cut straw is rather preferable. The ensilage may be left to cure and to keep until wanted, be that time four weeks or ten months. When the ensilage is uncovered for feeding, unless the silo be frost-proof over-head, it becomes chilled, and is then not in the best condition for being fed to cattle. That may be guarded against by the putting of movable poles at the top of the silo and the placing of a layer of straw upon them.

### SIZE AND COST OF SILOS.

A silo 18 by 20 by 18 feet deep, inside measurement, will hold about 100 tons of settled corn ensilage. That allows for the ensilage to settle to a depth of 14 feet. Every hundred acre farm should have one of at least that capacity. The probable cost may be easily calculated. If built inside of a barn the total cost, (lumber at $10 a thousand and tar paper at from 2½ to 3 cents per square yard put on), need not exceed $70 for a silo of 100 tons capacity. If erected outside the cost will vary according to the finish of the building, the quality of lumber used, the price of materials, etc., etc. Twelve tons of ensilage per acre may be reckoned upon with certainty in nearly every district of the Dominion. Every two tons of ensilage, from corn which has been well matured, have a feeding value equal to one ton of ordinary hay for the production of milk or the maintenance of cattle, horses and sheep; and 100 tons of ensilage can be grown and cured at a total cost for rent, seed, labor, etc., not exceeding $1.75 per ton in almost any part of the Dominion.

## No. 5—NOTES FOR CHEESE-MAKERS FOR JULY.

July cheese, like July butter, has a reputation for being the poorest of the summer. This year it should be exceptionally fine. The abundance of grass in June, with a too plentiful rainfall, will leave the pasture with richer herbage than usual.

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Suitable conditions for the production, preparation and preservation of the milk in a fit state for the manufacture of fine cheese can be continued by the patrons giving effect to these simple requirements :—

1. Cows need the owner's providential care in the following matter, viz. :—

(*a*) An abundant allowance of succulent or other feed ;
(*b*) Opportunity to drink pure water at least twice a day ;
(*c*) Access to salt every day ;
(*d*) Shade in the pasture fields from the weakening influence of July suns ;
(*e*) Regularity in milking ;
(*f*) Management and handling with continuous kindness, and an eye to profits.

2. Cows should be prevented from drinking impure water and should be protected against the attentions of all dogs.

3. (*a*) Milk should be strained immediately after it is drawn from the cow ;
(*b*) It should be aired by the use of an aërator or by dipping, pouring or stirring ;
(*c*) It should be cooled to the temperature of the atmosphere ;
(*d*) It should be protected from contamination by the foulness of impure air.

It will be of quick and durable advantage to direct the attention of all patrons to these matters by sending to each a concise, clear and courteous reminder of duty in connection therewith.

When the yield of milk by the cows begins to shrink, the temptation to make up the quantity in some other way is increased. The Act passed by the Dominion Parliament to provide against frauds in the supplying of milk to cheese, butter and condensed milk manufactories is a piece of wholesome legislation.

It forbids the sending to any such factory (1) milk diluted with water, or (2) milk in any way adulterated, or (3) milk from which any cream has been taken, or (4) milk commonly known as skimmed milk from which any portion of that part of the milk known as strippings has been kept back, or (6) any milk that is tainted or partly sour. The penalty for each offence against the provisions of the Act, upon conviction thereof before any justice or justices of the peace, is a fine not exceeding fifty dollars and not less than five dollars, together with the costs of prosecution.

The fine when recovered shall be payable, one-half to the informant or complainant, and the other half to the representative of the factory to which the milk was sent, to be distributed among the patrons in proportion to their respective interests in the product thereof.

Let every cheese-maker get a copy of this Bulletin published in the local newspaper, and further, let him see that every patron is furnished with a copy of that issue.

Some of the qualities that are expected and desirable in the cheese of July are :—

1. Rich, clean, creamy flavour ;
2. Solid, firm, buttery body ;
3. Fine, silky, flaky texture ;
4. Bright, uniform colour ;
5. Attractive, neat, symmetrical, stylish appearance.

In order that cheese having just these qualities may be manufactured regularly, I make the following notes for guidance :—

1. Thorough distribution of the rennet in the milk must be effected by diluting the rennet extract and by vigorous stirring.

2. Sufficient rennet to coagulate the curd into a state fit for cutting in from 35 to 40 minutes at from 86° to 90° should be used. When an extra quantity of rennet is used, a corresponding increase in the weight of salt should be added to the curd.

3. The contents of the vat should be perfectly still when coagulation commences. Vibration of the floor and of the vat during the thickening of the milk causes waste.



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4. The horizontal knife should be used first in cutting; and active stirring should not commence until the cubes of curd become slightly heated.

5. The temperature should be raised gradually to 96° or 98° Fahr.

6. The stirring should be continued until the curd particles are so well "cooked" or "dried" that when a handful has been pressed for a few moments they will fall apart again as the result of any slight disturbance.

7. As soon as the presence of acid is discernible by the hot iron test, the whey should be removed. In the case of gassy curds, a further development of acid before the drawing of the whey will be beneficial.

8. Hand stirring will be of advantage *until the curd is firm.*

9. The temperature should be maintained at or above 94°.

10. The curd should be allowed to mat into one mass.

11. It should be turned so frequently that the whey will not collect or stand in small pools in or on it.

12. If it becomes gassy it should be aired (if need be by grinding and stirring) and afterwards kept at a temperature above 94°.

13. The gas formed in gassy curds hinders the development of acid; and the presence of acid prevents the formation of gas. The treatment should provide for the removal of gas by aëration and the maintenance of temperature by the application of hot water to the curd, or steam to the vat or sink in which it is.

14. Close matting and packing of the curd are beneficial only after the curd is sufficiently dry and when aëration is provided for.

15. When the texture of the curd becomes stringy in its nature, it should be put through the cutter or grinder.

16. Aëration should be effected by the stirring of the curd before the addition of salt. Usually 15 minutes of such treatment will suffice.

17. Salt should be added at the rate of from 2½ to 2¾ lb. per 1,000 lb. of milk, according to the dry or wet condition of the curd. A judicious variation in the quantity of salt should be made in proportion to the moist or dry state.

18. The "hooping" of the curd should begin when the harsh surface, produced on each piece of curd by the salt, commences to give place to a slippy, mellow quality.

19. Shoulders or projecting edges on cheese are unsightly evidences of careless workmanship, and lessen their value from 2 to 3 shillings per cwt. in the English markets. Careful pressing and bandaging and the turning of cheese in the hoops in the morning will prevent their formation. The pressure should be continued for at least 20 hours. In that way cheese can be finished having an attractive, neat, symmetrical, and stylish appearance.

20. The sprinkling of cold water in the curing rooms in the morning and just after noon will reduce the temperature.

The curing room should be thoroughly ventilated and should be kept clean.

## No. 6—NOTES FOR CHEESE-MAKERS FOR AUGUST.

A cheese factory's reputation is largely determined by the quality of its August September and October output. The beginning of August is a fit time for every cheese-maker, who has had only partial success during the hot weather, to redeem his reputation and that of his factory. A comparison of the prices realized for the summer cheese of Ontario with the figures reported from the United States market, shows that Canadian cheese are in demand at higher rates than United States cheese will sell for. That we have gained in reputation and in market favour with British importers and consumers, is evident. That this advance and advantage are the result of the applied skill of less than half of our cheese-makers, is well known to those who visit the factories and handle their products. To reach and to speedily help those

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who work in cheese factories without any ambition or aspiration for improvement is well-nigh impracticable.

However, we desire to make helpful information not only attainable but unavoidable to such.

In a short time there will be numerous cable orders from England, calling for "cool August cheese." That brief description implies a mild, rich flavour that may be preserved for the winter trade, a firm, solid body "full of meatiness," a fine outside finish, with clean, bright rinds, free from cracks, and bandages fresh-looking and not likely to appear mouldy.

To help the cheese-makers in manufacturing a class of goods that may be satisfactorily shipped on such orders, I call attention to some things, both outside and inside of the factories which need their immediate and special personal care.

*Around the Premises.*—Insufficient or inefficient drainage facilities, unless enlarged or remedied, will show their worst effects during this month. At the cost of only a few hours of labour and a few dollars of expense, the immediate vicinity of every factory can be kept free from the noxious odours that arise from stagnant slop pools. The frequency and foulness of these about the factories in some sections, is not only a menace to the permanent prosperity of our cheese manufacturing industry, but a disgrace to the men in charge of the factories.

At factories from which whey is drawn back to the patrons' farms in waggons, the leaking and spilling near the whey tank, too often leave its vicinity in an almost impassable condition. A few loads of gravel will abate the nuisance, and leave the place fit for approach during the succeeding months when the roads become bad.

The shrinkage in the milk supply will leave a shortage in the whey tank. In order that the whey may have more feeding value, the tank should be thoroughly cleaned and washed at least once a week.

At factories were hogs are fed, provision should be made for supplying them with one feed a day of some green fodder, such as clover, oats and vetches, oats and pease, or cornstalks. Salt should be fed liberally during this month.

*In the Making-room.*—This month seems the one when flies become most numerous and troublesome. Some afternoon after the cheese are in the hoops, it will be a good plan to close the making-room windows and doors, and to burn a small quantity of sulphur for the purpose of fumigating the place. If a tablespoonful of alcohol be mixed with the sulphur, it will burn more freely. Care must be taken to prevent the fumes from getting into the curing room. The tins of the milk vats and the insides of the sinks should also be washed afterwards before they are used. All vats, presses and utensils should get a thorough quarterly-cleaning-up early this month. The use of a solution of borax on the hoops will help to prevent mouldiness on the sides of the cheese.

Every cheese-maker should presistently fight untidiness and filth in every form, and he ought to have a woman's passion for cleanliness and a similar antagonism to dirt.

*In the Curing-room.*—There will be difficulty in curing the cheese made during July at a sufficiently low temperature. Ventilation of the room during the early mornings, as well as during the evenings and nights, will be of benefit. Floors should be sprinkled with cold water morning, noon and evening. While the cheese are being turned on the shelves there should be an abundant admission of light. August is the month when the "skippers" are apt to do damage. A plentiful shaking of fly powder in the room before it is shut up for the day will destroy the cheese flies.

Cheese boxes should not be stored in the curing-room. The odour from the elm wood penetrates the cheese and affects their flavour.

*Patrons.*—Since the milk is richer and less in quality, there will be an increased temptation to "even up" by the addition of water, or to "even down" by the removal of cream. You will be doing the community moral service, as well as the cheese trade some good, by reminding the patrons that the Dominion Act on adulteration of milk, is in force and will be enforced against all discovered delinquents.



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Patrons are more likely during this month than at any other times, to forget to provide salt for their cows, and to neglect to supply an abundance of pure cold water. Cool evenings are no excuse for the neglect of aëration. All milk should be most thoroughly aired immediately after it is strained.

The making of cheese for exhibitions is usually undertaken during the first two weeks in this month. Send a circular to every patron, making mention of those matters that are referred to in this bulletin, and inviting their co-operation, in order to aid you in the manufacture of cheese fine enough for exhibition and prize-taking. If some patrons pay no heed, and no improvement results, don't get discouraged. Keep right on insisting on a better state of things in their practice.

*Making the Cheese.*—When the evenings are cool and the milk needs ripening, don't fail to leave it in the vat until it reaches the proper state of maturity, before the rennet is added. Use enough rennet to coagulate mature milk to a state fit for cutting, in forty minutes when set at 88° Fahr. Dilute the rennet extract to the extent of one pailful of water for every vatful of milk, and then mix it thoroughly by vigorous, rapid stirring.

When you are troubled with gassy curds, allow a development of acid, such as will be indicated by threads from the hot iron test, a quarter of an inch long, before the removal of the whey. It is a good plan to run most of the whey off at an earlier stage, and to leave only enough whey on the curd to permit a free stirring of it. After the whey is drawn, air the curd thoroughly, and make provision for keeping it warm. When a curd sink is used, if need be to retain the heat, put the curd back into the vat, but let the temperature be kept above 94°. Frequent turning and aëration will facilitate the development of acid, providing the temperature is maintained. After the curd cutter has been used, the curd should be stirred and aired for fifteen or twenty minutes before the application of salt. From $2\frac{1}{2}$ to $2\frac{3}{4}$ pounds of salt per thousand pounds of milk should be added to curds that are fairly well dried by the previous stirring. They should be put in the hoops within twenty minutes after the salt has been mixed in.

Pressure should be applied very gradually. The cheese should be bandaged neatly, when they are turned in the hoops within two hours after they are put in the presses. They should again be turned in the hoops some time in the following morning. Where practicable, cheese should be pressed for at least twenty hours.

Endeavour to get everyone who sends milk to your factory, or who is concerned in its management, to try to bring it to the very front in point of reputation for the excellent quality of its product. Work conscientiously for that end, then talk your factory up always and wherever you go, and get your patrons to do likewise. In short, think and work to make your factory and its product worthy of a higher reputation, especially for August cheese.

## No. 7—NOTES FOR CHEESE-MAKERS FOR OCTOBER.

A few years ago "October cheese" of Canadian make were deservedly in bad repute in the English markets. Their soft, porous body made them liable to go off in flavour quickly; they did not possess the keeping qualities, combined with that richness of body and flavour, which are so much desired by English merchants and consumers. During the last two or three years a decided improvement in the quality has been effected; and with the finer quality has come a better reputation in the markets. By the exercise of due care on the part of the cheese-makers throughout the remainder of this season, the reputation of our "October cheese" may be so well established that hereafter they will be counted equal to "September's." Cheese can be made as *firm* and *fine* during October as at any other time of the year. Suitable conveniences for controlling the temperature of the curd, from the milk vat until the cheese is ripe, are required.

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## MILK.

The milk delivered at factories during October has a higher per cent. of fat and other solids than during the summer months. Its flavour will be equally rich and nice, when the cows are stabled during the cold nights and fed liberally on fodder corn or any other suitable succulent nutritious feed. Turnip tops and rape should not be fed to cows whose milk is furnished to a cheese factory. After the milk is drawn it should be strained immediately, and forthwith aired as thoroughly as during the hot weather of July. The aëration will improve its flavour and prepare it for the manufacture of a finer quality of cheese than it will be possible to obtain if that treatment is neglected. The milk should not be cooled below 60° Fah. A milk house or the farm kitchen will be a more suitable place for keeping it over night, than the open milk-stands when the temperature of the outside air goes below 50°.

## CHEESE-MAKING.

The construction and equipment of the making-rooms of some factories are still defective. At the cost of a little labour and building paper, almost any room can be made so close in its walls that the inside temperature may be regulated at will by the use of a stove or steampipes. Thorough ventilation once every day should be secured. The following paragraphs will be of service in refreshing the experienced cheese-maker's memory and in instructing the others in the best practices.

1. Let the milk be ripened by the application of heat before the rennet is put into it. The ripening should be allowed to proceed to such a degree that not more than three hours will be required between the addition of the rennet and the development of acid perceptible to the taste or discernible by the hot iron test.

2. The use of sour whey to hasten the ripening should not be resorted to. Old milk which has become nearly sour to the taste may be added, but loppered or thick milk should never be used.

3. Rennet should be added in quantities to coagulate the curd into a state firm enough for cutting in from 45 to 35 minutes at temperature of 86° or 88° Fah. It should be diluted with water to the volume of at least one gallon of liquid for every vat.

4. After coagulation is perfect the curd should be cut finer than during the summer. The application of heat should be delayed for 15 minutes after stirring is commenced; and the temperature should be raised to 98° and maintained at that point until the whey is drawn off. After the middle of the month a temperature of 100° will be preferable.

5. Care should be taken to so apply the heat and perform the stirring that the curd particles will be so dry, before the development of acid is perceptible, that after a handful has been pressed into a lump, they will separate readily.

6. The curd should be stirred before and after the removal of the whey until the whey is so well separated out of combination with its particles, that they produce a squeaky sound when bruised between the teeth or otherwise.

7. After the whey is drawn off, the curd should be kept at a temperature above 94°. If it becomes colder than 94°, the development of acid will be hindered, and excessive moisture will be retained in it during the souring process. The presence of such extra moisture in the curd at this stage will leave the cheese with a weak, "pasty", or "tallowy" body, according to the degree of acid development permitted.

8. A cover over the vat or a curd sink with steam pipes, seems a simple and effective provision for keeping the curd warm. Where no rack is used, the putting of a few pails of hot water in the lowered end of the vat will maintain the temperature.

9. Just after the removal of the whey, the curd should be hand stirred until after the whey, that will run, has been drained off. *After the curd is dry and firm* it may be allowed to mat into one mass, *but not before that condition is reached.* All stirring should be performed so as to avoid wasteful bruising of the grain of the curd.

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10. It may then be frequently turned and packed close, till the layers of curd are four or five deep. Whey should never be allowed to collect in small pools on it at this stage. The close packing in layers four or five deep, with frequent turning, prevents the outside of the matted pieces from becoming chilled or more deeply coloured by the action of the air than the rest of the curd.

11. The hot iron test is almost indispensable for determining with certainty, from day to day, the exact stage of acid development at which the whey should be drawn off. The filaments—thread-like processes—should be about one-quarter of an inch long. The proper degree of change for the cutting and salting of the curd has taken place, when it feels mellow, velvety and "slippy," and shows a texture passing from the flakey or leafy into the stringy and fibrous. If it be too moist or soft, it should be cut or ground at a rather earlier stage and hand-stirred until dry enough, before the addition of salt. The most of the hand-stirring should precede the salting.

12. Not less than 3 lb. of salt per 1,000 lb. of milk should be used, and when the curd is on the soft or moist side, 3¼ lb per 1,000 lb. of milk should be added; the 3¼ lb. rate is also preferable during the latter part of the month when cold weather prevails.

13. Immediately after the application of salt, the pieces of curd become harsh and gritty on the surface; then in from 15 to 25 minutes the harshness gives place to a mellow condition. At the second stage—and the temperature should not be under 88°—the curd should be hooped and pressure applied. Delay at this point or coldness of the curd, destroys the desirable rosy flavour, and imparts to the cheese the bitter taste of the salty white whey.

14. Particular care should be taken to use only pure warm water when turning the cheese for bandaging, before the rinds are fully formed.

15. Especially in a cold press room, pains should be taken to apply heavy pressure to the cheese before they are left for the night.

16. All cheese should be finished in symmetrical shape and kept in the hoops until the rinds are smooth and the edges free from any projecting "shoulders."

### CURING THE CHEESE.

The temperature of the curing-room should be kept as nearly regular at 65° as possible. Where the September cheese are kept in the same room with those of October make, the latter should be kept on the warmer shelves. A slight chilling, after a cheese has been curing at 65° for two weeks, does little damage; but a steady temperature and constant curing give the best results. Bitter-flavoured cheese are usually the result of chilling in either the making-room, press-room or curing-room. If the cause be prevented, the consequence will be unknown.

### TO FACTORY MANAGERS.

As this is the last Bulletin of NOTES FOR CHEESE-MAKERS for this season, I desire to counsel the managers of factories to guard against tendencies that appear to menace the permanent success of our cheese industry, viz:—

1. The employment of inexperienced, incompetent men to manage the inside work of the factories.

2. The conscienceless cutting down of the remuneration of the makers, until the able men are leaving the occupation.

3. The inevitably penny-wise and pound-foolish policy of using factory furnishings of poor quality, simply because they happen to be a little lower in price.

So much additional trouble, loss, worry and disappointment, result from the putting of men without aptitude or experience in charge of large factories, that I strongly urge the proprietors to exercise the utmost care and caution, and invariably to inform themselves as to the fitness of an applicant by enquiry from a reliable expert or cheese-buyer. No factory should incur needless risk of a loss of reputation, of patronage, of prestige, of price or profit.

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## VII.—STANDARDS FOR MILK AND LEGISLATION IN REFERENCE TO ADULTERATION.

Discussions on the need and desirability of the establishment of a legal standard of quality for milk, have been frequent during late years. These have revealed so many different ideas as to the nature, purpose, use and application of such standards, that it seems difficult to reconcile them with the needs of the conditions prevailing in our Dominion. To further a solution of that problem in a practically useful way, I propose to offer a few suggestions and recommendations by way of pointing out how some of the difficulties may be overcome and provided for, while care is taken to protect the interests of both the ordinary purchasers and producers of milk.

### THE MILK OF COWS.

The milk of cows, as the dairyman needs to know it, is composed of substances partly in solution and partly in suspension. It may be described as a thin emulsion of fat, in a serum or watery solution of albuminous matter, sugar, and mineral matters. When obtained from a healthy cow in its normal state, it has a constant tendency towards acidity. It will change the colour of litmus paper, before lactic acid has been developed. A small quantity of carbonic acid is generated soon after it is drawn, if left warm; but that can be taken out by agitation and aëration. The true sourness of milk is caused by the development of lactic acid. The specific gravity of milk varies between 1029 and 1035 at 60° Fahr.; that is to say, a quantity of milk equal in bulk to as much water as will weigh 1000 pounds at 60° Fahr. will weigh from 1029 to 1035 pounds at the same temperature. The effect of each per cent. of fat is to decrease the specific gravity, because the fat of milk is lighter than its other parts. The effect of each per cent. of solids-other-than-fat is to increase the specific gravity. The total solids of ordinary milk vary between 12 and 16 per cent. In some unusual instances the range of variation has been known to be between 11 per cent. and 20 per cent. of total solids, and between 2 per cent. and 10 per cent. of fat. The solids of milk are its only constituents that have any real or rateable value. The water that is put into the milk by the cow, while the process of elaboration is proceeding in her udder, is worth no more per pound or per gallon, than the water that may be put in by a man when it has come into his hands for use or sale. The limits of variation of the solids-other-than-fat, are usually within one-half of one per cent. in the same cow at different periods in her milking season. Different cows of the same breed, rarely show a variation of more than one per cent. in the solids-other-than-fat contained in their milk. The greatest difference exists between cows of different breeds; it will sometimes reach as much as two and a-half per cent., as between the milk of cows giving extra rich milk and those yielding a very poor quality. The solids-other-than-fat, or the solids in the serum of the milk also increase slightly during the milking season; the rate is about ·04 per cent. of solids-not-fat per month.

### *Composition of Milk.*

The average composition of milk from cows may be stated as:—

| | Colustrum Per cent. | Normal Milk Per cent. |
|---|---|---|
| Water | 75·8 | 87 |
| Fat | 2·6 | 3·75 |
| Casein | 15 | 3·80 |
| Albumen | | ·75 |
| Sugar | 3·6 | 4 |
| Ash | 3 | ·70 |

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The strippings of milk designate the last portion drawn from the udder of the cow at each milking, and they are richer in fat than the milk first obtained. The first milk may contain less than one per cent. of butter fat, while the very last milk drawn, yields more than ten per cent.

*Cream.*

Cream has no definite or unvarying composition. It is a word used to define that part of milk into which a large per cent. of its fat has been gathered by setting or by centrifugal force. It is composed of the same constituents as milk, but they are not in the same nor in any constant relative proportion. Frequently the cream of hotels is of a beautiful blue colour, but that liquid does not belong to the products of the dairyman. The results of a great many analyses show that the cream of commerce, may contain anywhere from 8 to 70 per cent. of fat. All the fat of milk is held in suspension in its liquid or serum part, in the form of tiny globules which have no coverings of an organic nature, but are present in the form of an emulsion.

*Value of Parts.*

The different constituents of milk have different values, according to the ultimate purpose for which they are to be used. The fat is mainly valuable for giving cream its quality, butter its main substance, and richness to the body of cheese.

The casein is the portion which is coagulated by the action of rennet in the process of cheese-making. Albumen may be seen as a thin white scum on milk that has been scalded or boiled; it is similar in composition to the white of eggs. Sugar is one of the heat producing and fattening constituents of milk. Lactic acid has no feeding value, but being anti-febrile in its action with properties that slightly aid in digestion, a small quantity of it is not unwholesome in milk for drinking or for feeding in the stables. The ash of milk furnishes the mineral matter taken into the structure of bones and flesh by the animals which consume it. Where the milk is consumed in its liquid form or reduced in bulk to any of its products, such as butter, cheese, veal, or pork, the constituents which are valuable are its solids only.

Water is always nature's vehicle for moving things about in the animal and vegetable worlds for the support of different forms of life. The vehicle in itself is for carrying the constituents which the eater seeks to appropriate.

The ever changing demands and preferences of markets, make it impracticable to attach a definite value per pound to the several constituents of milk. The work of a skilful manipulator may give to any one of them an increased value. Milk sugar in the raw state in the milk has very little value indeed, as it can be replaced for the feeding of calves by substances that are plentiful and cheap, but in its refined state, fit for druggists' use, it is worth perhaps 75 cents per pound.

Judging of milk from a purely dairy standpoint, I would estimate that under the present conditions, if the butter fat of milk is worth 16 cents per pond in its unprepared or unmanufactured condition, the total solids-other-than-fat in the milk, will be equitably valued at 2½ cents per pound. The latter valuation of 2½ cents per pound has been based upon a scale of values, which places casein at 4½ cents, albumen at 3 cents, and sugar at 1 cent per pound.

NATURE OF STANDARD REQUIRED.

The variability in the quality of milk is due to so many causes, some of which are not controllable by the dairyman, that at first sight it may seem unfair to establish an arbitrary standard of quality, for the purpose of prohibiting the sale of milk which may not come up to its requirements. Milk may be called *pure*, when it is obtained from healthy cows that have been well-fed and kept under wholesome conditions of surroundings and treatment, and to which nothing has been added and from which none of its parts or constituents have been kept back or removed. *Pure* milk is not necessarily milk of a given standard of quality, as that may be estimated at the average of milk furnished from well-kept, well-fed herds of cattle. There may be

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*pure* unadulterated milk that may be also *poor* unadulterated milk Its poverty or the weakness of its quality may arise from the individuality of the animals, from the kind and condition of the feed, from lack of shelter, want of salt, ill-treatment or other bad management.

The experience of the householders and consumers of milk has been such, that an undoubted need exists for the inspection of the milk supply of towns and cities; and to make such inspection at all effective or adequate, it appears to be necessary that a legal standard of quality applicable to that branch of the dairy business, should be established.

If several standards of quality, were defined, and the question of describing the milk according to one of them were left optional for a business arrangement between the seller and buyer, the unthinking and unsuspecting public would sometimes be furnished with milk not up to the standard by which it was described. For instance, milk containing 12 per cent. of solids might be described as Ordinary No. 2; milk containing 13 per cent. of solids might be described as Ordinary No. 1; milk containing 14 per cent. of solids might be described as Extra No. 1; milk containing 11 per cent. of solids might be described as Grade No. 3. Even such an arrangement would still demand the action of some qualified inspector, to insure that the milk delivered was of a quality according to the description under which it was sold.

The matter of entirely prohibiting the sale of milk below a certain standard of quality, if properly described according to its contents of solids, would seem to be arbitrary, partaking of the nature of sumptuary legislation, which is always distasteful to the people, and therefore difficult of being enforced. Still the public health and welfare are of such importance, and depend so much, in many cases, upon the quality of the milk which is sold, that a total prohibition of the indiscriminate sale to householders of milk containing less than 12 per cent. of solids,—3½ per cent. of which should be butter-fat—, seems to be both desirable and necessary. Milk of an inferior grade,—sold under its proper description as such—could be used without injury for cooking purposes or for table use by adults, without detriment to either buyer or seller.

The legitimate and commendable objects of a legal standard seem to be two:—
(1) To prevent fraud by the adulteration of the liquid as it is given by the cows;
(2) To guarantee to the unsuspecting consumer that he is receiving, in the liquid which he purchases under the name of milk, a commodity at least up to a certain recognised standard of strength.

The legislation dealing with the supplying of milk to factories for use in the manufacture of more concentrated dairy products, such as butter and cheese, should likewise have a two-fold object; but since the nature of the latter transactions in milk is slightly different, the application of the standard cannot be quite the same, as in the case of milk for towns or cities.

### DIFFERENT REQUIREMENTS FOR HOUSE USE AND FACTORY USE.

It seems necessary to make as clear as possible the distinction that exists and which should be recognised, between the business of furnishing milk for table use and that of supplying milk to factories for manufacturing purposes. In the former case every transaction is a sale outright as between a milk-dealer and his customer. In the other case, the furnishing of milk is generally done under a business arrangement whereby a patron of the factory participates *pro rata*, according to the quantity of the milk which he has furnished, in the proceeds from the sales of the product or products made therefrom.

For *city supply*, the ends sought to be gained by legislation and its enforcement are the supplying of wholesome milk, honest milk, pure milk, sweet milk, milk of certified strength, in order that the purchaser may obtain equitable value.

For *the supply at factories*, the aim of all legislation and regulations should be to secure the supplying of honest, pure, wholesome milk. Then, to provide for a fair and equitable valuation of milk furnished by each of the patrons of any factory, it would seem desirable and necessary, that all the milk should be of equal or nearly

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equal value per unit of measure, or that two measures of valuation should be applied; namely, the ordinary one of weight, and another one of strength or per cent. of solids, whereby the true relative value per hundred pounds of milk of different qualities, might be ascertained.

The nature of any standard that may be fixed, must make provisions for these two distinctly different branches of the milk trade and the relation of the public thereto. If any individual offers for direct sale to house-holders, milk which falls below the standard of quality that is prescribed by law, it should be held to be *unmerchantable as ordinary standard milk*, whether it owes its weakness to having been watered or skimmed by a man or a cow.

The countries of the old world, in fact, nearly all the governments of civilised communities, have somewhat stringent laws relating to the adulteration of the so-called perfect food. The adulterating substances that have been discovered in it are so varied and numerous, that I refrain from making a list of their names in this connection; but over 90 per cent. of all such cases have been effected simply by the addition of water or the removal of part of the cream.

Standards for pure milk have been adopted as follows:—

| | Total Solids. Per cent. | Butter-fat. Per cent. | Other Solids. Per cent. |
|---|---|---|---|
| Society of Public Analysts, England | 11·5 | 3 | 8·5 |
| France | 13 | 4 | 9 |
| Massachussetts | 13 | .... | .... |
| Minnesota | 12 | 3 | 9 |
| New Jersey | 12 | .... | .... |
| New York | 12 | 3 | 9 |
| Wisconsin | ..... | 3 | .... |
| For Canada there has been recommended by Mr. Thomas Macfarlane, Chief Analyst, a standard of | 12 | 3·5 | 8·5 |

While recognising the natural differences that exist as between the milk of different cows, and at different seasons of the year, Mr. Macfarlane bases his judgment upon the results of a large number of analyses of milk from many parts of the Dominion.

The fat is the most variable constituent in milk, and it varies so much as between the quality of the first milk drawn from the cow at each milking, and the "strippings," or last drawn from the same animal, that if the "strippings" be kept back, that practice is quite equal, in its weakening effect upon the quality of the milk, to the removal of a large portion of the cream. The following may be taken as denoting the relative percentages of fat to be found in the different portions of one milking:—

| | | |
|---|---|---|
| First milking | ½ | per cent. of fat. |
| Middle milking | 2 | do do |
| Strippings, or last milking | 8 | do do |

In view of these facts, it may be complained that if a man is unable to control or to compel his cow to give milk of a uniform quality or strength, it would be unfair to render him liable to a penalty for the sale of an honest product. A law which makes it possible to inflict imprisonment or any other disgrace upon an honest man, because his cow played him false, must be an unjustifiable one, unless it can be shown that in every case where a cow yields milk of inferior quality her owner was guilty of contributory negligence or cruelty. If these were the sole cause of milk being poor in solid constituents, I would hold up both hands, and use both voice and pen for the speedy enactment and rigid enforcement of legislation dealing with the guilty ones. But while it may be unfair to punish a man by law for keeping cows that yield poor milk, it is quite fair, and even essential, that such a man should be prohibited from disposing of his milk to

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an unsuspecting consumer for what it is not,—namely, milk of good average quality.

If a legal standard were made so low as to include the poorest of the milk, given by the poorest of cows, kept by the poorest of dairymen, in the poorest kind of way, then all milk might be adulterated down to that grade and still be sold legally for milk of standard quality. The establishment of such a low limit would offer a temptation —and an additional one is not required—to dilute all milk down to the limit allowed by the law.

The law should certainly first provide for the punishment of dishonest practices by adulteration, dilution, or removal of fat by skimming or witholding the "strippings"; and it should also make it illegal to offer for sale without a specific description, any milk that is below a standard of quality such as has been recommended by the Chief Analyst of the Dominion. Skim milk, or butter-milk, or milk of a lower grade could be sold upon its merits, according to the description of its true quality.

### MILK FOR CITIES AND TOWNS.

The quantity of milk consumed in the towns and cities of the Dominion is yearly increasing in quantity and value. No means are at hand for ascertaining with exactness the volume of the business annually, but I estimate that $4,000,000 is well within the limits of the retail value of the milk consumed in the six cities of Canada from which the Chief Analyst obtained his samples for analyses, as the basis for the recommendation of a standard of 12 per cent. solids. It is very necessary as a matter of commerce, and still more so in consideration of the public health, that the milk should be honest and wholesome in its character. With regard to the per cent. of butter fat, found in samples in the various districts, the following is the showing as taken from Bulletin I, Inland Revenue Department.

| —— | Highest Per cent. of Fat. | Lowest Per cent. of Fat. | Average Per cent. of Fat. |
|---|---|---|---|
| Halifax | 5·40 | 3·00 | 4·24 |
| St. John | 4·62 | 3·43 | 3·91 |
| Quebec | 4·18 | 3·02 | 3·54 |
| Montreal | 5·17 | 2·80 | 3·82 |
| Ottawa | 5·29 | 3·62 | 4·26 |
| Toronto | 4·50 | 2·52 | 3·38 |
| Total average | | | 3·86 |

"It thus appears, that there are whole milks offered for sale in the cities of the "Dominion, likely enough at the same price, whose percentage of butter fat varies "from 2·52 to 5·40. This variation is, no doubt, caused by differences in the breed, "condition or feeding of the animals. The number of the inferior samples is, how-"ever, small; among the 162 samples analysed in Ottawa, 35 are between 3 and 3·5 "per cent., and only eleven below 3. Still, the fact remains that the richest samples "might be diluted with an equal amount of water and still be as good, so far as re-"gards butter, as some of the inferior sorts of genuine milk. Watering, even to a "slight degree, may be readily detected, and, under the present law, punished. This "may also be accomplished when milk is skimmed, but it does not seem fair that "the dairyman, who mixes say fifty per cent. skim milk with a whole milk of 4·5 "per cent., thus reducing it to 3·2 of butter fat, should be punished, while the man

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"who keeps poor animals, feeds them insufficiently and sells milk containing only "2·75 per cent. butter fat, which may be legally genuine, should be allowed to es- "cape.

* * * * * * * * *

"The "total solids" or "dry substance," as the Germans call it, is obtained by "adding together the butterfat and the "other solids" given in the tables. The "averages shewn in the various districts are as follows:—

| | |
|---|---|
| Halifax | 12·72 |
| St. John | 12·45 |
| Quebec | 12·39 |
| Montreal | 12·29 |
| Ottawa | 12·93 |
| Toronto | 12·08 |
| Total Average | 12·48 p.c. total solids. |

* * * * * * * * *

"The total average of butterfat found in the whole 162 samples is 3·86 per cent., "which deducted from the average total solids, 12·48 per cent., leaves for the solids- "other-than-fat 8·62 per cent. In the event of standards being established in Can- "ada, it would seem wise to adopt the principle that milk must be of good standard "quality, and to establish the following as the *lowest* limits for its contents in nutri- "tive substances :—

| | |
|---|---|
| Total solids | 12·0 per cent. |
| Butter fat | 3·5 " |
| Solids other than fat | 8·5 " |

"Since skim milk contains at least 0·5 per cent. butter fat, it follows that, when "sold, it should be required to contain 9 per cent. total solids.

"The foregoing figures will serve to show that the public must not wholly rely "on the Department to prevent the sale of inferior qualities of whole milk, but must "exercise discrimination themselves. The value of the various milks on the market "depends on the amount of butter they contain."

In a later Bulletin of date, 30th October, 1889, Mr. Macfarlane presents some information on summer milk:—

"If the average be taken of the milks from the twenty-four herds above des- "cribed (excluding the one marked as pure Jersey) it is found to amount to 12·62 "per cent. total solids and 3·66 per cent. butter fat. The latter figure is lower than "the average of the samples described in Bulletin No. 1 which was 3·86 per cent., "although the total solids show no diminution. Still the difference in the butter fat "is not such as to call for any change in the recommendation already made of 12 "per cent. total solids and 3·5 per cent. butter fat as the lowest limits for milk of "good standard quality."

In a still later Bulletin, No. 17, Mr. Macfarlane deals with the milk supply of Towns. The object of this bulletin is set forth in its preface:—

"In former reports regarding milk supply the particulars given, had reference "chiefly to the cities and larger towns of the Dominion. In several of these—such as "Montreal, Toronto, Hamilton and London—the examination of milk is now carried "on either by a special food inspector appointed by the municipality and working "under the Adulteration Act, or by medical health officers exercising the powers "conferred on them by such statutes as chapter 205 of the Revised Statutes of Ontario. "On account of these circumstances, it was thought advisable during the first quarter "of the present fiscal year to collect samples of milk sold in some of the smaller "towns of Ontario. In order to do this fairly, and obtain a correct estimate of "the quality of the milk supplied in the towns visited, the collectors were instructed "to obtain samples from as many vendors as possible in each place. The particulars "regarding these and the results obtained in their analyses are given in the follow- "ing tables" :—

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The conclusions are set forth in the summary which follows:—

"The following summary shows the number of the samples taken in each of the "towns visited, and the number of genuine samples obtained, as well as of those judged "to be adulterated or inferior, in view of the facts recorded in the foregoing tables:—

| | No. of Samples taken. | No. Genuine. | No. Adulterated or Inferior. |
|---|---|---|---|
| Hull, P.Q | 15 | 10 | 5 |
| Alexandria | 12 | 7 | 5 |
| Cornwall | 9 | 9 | 0 |
| Prescott | 7 | 4 | 3 |
| Cardinal | 2 | 0 | 2 |
| Morrisburg | 9 | 6 | 3 |
| Peterborough | 7 | 2 | 5 |
| Lindsay | 5 | 3 | 2 |
| Beaverton | 5 | 1 | 4 |
| Orillia | 8 | 7 | 1 |
| Barrie | 7 | 2 | 5 |
| Bradford | 6 | 1 | 5 |
| Newmarket | 4 | 2 | 2 |
| Aurora | 4 | 2 | 2 |
| Toronto | 12 | 2 | 10 |
| Harriston | 10 | 8 | 2 |
| Walkerton | 5 | 3 | 2 |
| Paisley | 5 | 4 | 1 |
| Southampton | 4 | 1 | 3 |
| Listowel | 5 | 4 | 1 |
| Stratford | 10 | 7 | 3 |
| Seaforth | 4 | 4 | 0 |
| Clinton | 4 | 4 | 0 |
| Goderich | 6 | 4 | 2 |
| | 165 | 97 | 68" |

From these facts, which I have cited as existing in our own Dominion, it seems that the business of supplying milk at some places, is in rather a deplorable state; and urgent need exists for the enactment and enforcement of such legislation as will insure a supply of honest milk of good standard quality to everyone who wishes to purchase the same. The milk business, from a dairyman's point of view would be very much helped and improved, and the interests of the consumer would be protected. By the courts in other countries the sale of milk of inferior quality—though honest as given by the cows and pure as to condition—to unsuspecting persons who have not been notified of its weakness, has been held to be a fraud. The making of each herd its own standard of quality would provide for the suppression of dishonest practices, by adulteration but would not protect the consumer against milk of inferior quality.

*Enforcement for Convictions.*

In case of the enactment of a legal standard for milk, it would seem to be reasonable, in view of the variability of the milk from the cows, that no seller should be convicted under it until at least two samples of his supply upon different dates, had been found to be substantially below the required limits.

*Application of Public Health Act.*

The Ontario Public Health Act of 1884 provides for the inspection of cow byres, dairies, and places in which milk is sold or kept for general use in the following regulation, which is Clause 10, of Schedule A, being by-law in force in every municipality till altered by the Municipal Council:—

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"All milch cows and cow byres, and all dairies and other places in which milk "is sold or kept for general use, and all cheese factories and creameries shall be "subject to regular inspection under the direction of the said Board; and the pro- "prietors shall be required to obtain permission in writing from the Board, to keep "such dairy or other place in which milk is sold or kept as aforesaid, or to keep a "cheese factory or creamery, and the same shall not be kept by anyone without such "permission, which shall be granted after approval of such premises upon inspection, "subject to the condition that all such places as aforesaid are so kept and conducted "that the milk shall not contain any matter or thing liable to produce disease either "by reason of adulteration, contamination with sewage, absorption of disease germs "infection of cows, or any other generally recognised cause, and upon such conditions "being broken the said permission may be revoked by the Board."

The Ontario Public Health Amendment Act, 1887, at clause 5, provides as follows:—

"The Medical Health Officer under the direction of the Local Board of Health "shall have authority to make or cause to be made by a veterinary surgeon, or such "other competent person, as the circumstances may require, a periodic inspection "of all dairies, cheese factories and creameries, dairy farms and slaughter houses, "which come within his or their jurisdiction."

*Regulations at London, Ont.*

In the case of the cities, these regulations are enforced under the direction of the Local Board of Health. A plan that seems to be efficacious and beneficial has been carried into effect by the inspector in London, Ont., with gratifying results. For this purpose the city council enacted a by-law, which provides for inspection and examination by the inspector, and that any person offering milk for sale, shall first obtain a certificate from the health officer, that his animals are clean and healthy, that his stables and premises are also clean, that his waggon has his name and number painted upon it, and that he has complied with all the requirements of the by-law. Upon this certificate a license is issued by the city treasurer for one year, subject to be withdrawn at any time for infraction of the by-law. The fee paid for the license is one dollar annually. Nearly 100 dealers and over 1,200 cows are now under this system of inspection. The milk is examined by the official inspector twice a year, when a report of the results of the examination and also of the observations made during the inspection of the premises, stables and cattle, as well as the water and food supply, are made through the columns of the city press. As a consequence, the quality of the milk has been steadily improved during the past years. If other cities and towns would do likewise, a change for the better in the quality of the milk supply could speedily be effected.

*To guard against disease.*

Milk has been known to convey disease from the source of its supply to the homes of the customers into which it went. The following Ministerial regulations regarding the milk product in Prussia seem to be beneficial and necessary:—

(1). The milk is to be prevented from souring while being brought to market or depot by suitable cooling and cooling apparatus.

(2). Preserving the milk in vessels from which it can take up foreign materials (vessels of copper, brass, zinc, or earthen vessels with defective glazing, cast iron vessels with enamel containing lead) is prohibited.

(3). In the event of contagious diseases prevailing in the house of the milk producer or seller, or in the neighborhood, care must be taken that no possible spread of the disease can take place. Persons who come in contact with the patients should not have anything to do with handling the milk. All places which are set apart for keeping the milk should be kept especially clean and well-aired, and should be situated at a distance from the sleeping and sick rooms. These precautionary measures are also applicable to shops, where it is also required that the vessels be not kept open but closed.

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A similar enactment by the Provincial Authorities in Canada would be opportune and for the public welfare.

*Keeping the Milk Sweet.*

Many methods for the preservation of milk have been tried; but for ordinary practice the safest treatment is to observe the most scrupulous cleanliness in the stables and the utensils, and to cause the milk to be cooled down to 40 degrees, to insure its sweetness. The question of the frequent removal of milk from one vessel to another in transit, before or during its delivery to the customers, is one that needs more attention. As far as possible, milk should be delivered without frequent change of vessels between the first milk-pail and the customers' houses. Each change exposes the milk to an atmosphere which too often is impure. Thus its wholesomeness and keeping qualities are both endangered.

THE MILK FOR FACTORY USE.

In the regulation of the supplying of milk to factories for manufacturing uses, two existing difficulties have to be met and provided for. In some cases there occurs, while the milk is under the care of the patrons who furnish it, intentional adulteration by somebody and that apparently with dishonest motives. Then there exists the natural differences in the quality of the milk from different herds, but more particularly from different cows; and it is needful that some basis should be established and applied, providing for the equitable payment for such milk, according to its real value for manufacturing purposes. A value which does not consist wholly in the per cent. of solids, arises from the peculiar flavour and the conditions as to quality which result from the treatment and feed of the cow. To prevent the dishonest adulteration alluded to, there exist statutes by both the Dominion and the Ontario Governments. The following are the text of the same :—

CHAP. 43.

An Act to provide aganst frauds in the supplying of Milk to Cheese, Butter and condensed Milk Manufactories.

[*Assented to 2nd May*, 1889.]

HER Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows :—

MILK SUPPLIED TO FACTORIES TO BE UNADULTERATED.

1. No person shall sell, supply or send to any cheese or butter or condensed milk manufactory, or to the owner or manager thereof, or to any maker of butter, cheese or condensed milk, to be manufactured, milk diluted with water, or in any way adulterated, or milk from which any cream has been taken, or milk commonly known as skimmed milk.

A CERTAIN PART OF THE MILK NOT TO BE KEPT BACK.

2. No person who supplies, sends, sells or brings to any cheese, butter or condensed milk manufactory, or to the owner or manager thereof, or to the maker of cheese or butter or condensed milk, any milk to be manufactured into butter or cheese or condensed milk, shall keep back any portion of that part of the milk known as strippings.

AS TO TAINTED OR SOUR MILK.

3. No person shall knowingly sell, supply, bring or send to a cheese or butter or condensed milk manufactory, or to the owner or manager thereof, any milk that is tainted or partly sour.

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AS TO DISEASED ANIMAL.

4. No person shall sell, send or bring to a cheese or butter or condensed milk manufactory, or to the owner or manager thereof, or to the maker of such butter or cheese or condensed milk, any milk taken or drawn from a cow that he knows to be diseased at the time the milk is so taken or drawn from her.

PENALTY FOR CONTRAVENTION.

5. Every person who, by himself or by any other person to his knowledge, violates any of the provisions of the preceding sections of this Act, shall, for each offence upon conviction thereof before any justice or justices of the peace, forfeit and pay a fine not exceeding fifty dollars and not less than five dollars, together with the costs of prosecution, and in default of payment of such penalty and costs shall be liable to imprisonment with or without hard labour for a term not exceeding six months, unless the said penalty and the costs of enforcing the same be sooner paid.

WHO SHALL BE LIABLE.

6. The person on whose behalf any milk is sold, sent, supplied or brought to a cheese or butter or condensed milk manufactory for any of the purposes aforesaid, shall be *primâ facie* liable for the violation of any of the provisions of this Act.

WHAT SHALL BE EVIDENCE.

7. For the purpose of establishing the guilt of any person charged with the violation of any of the provisions of sections one, or two of this Act, it shall be sufficient *primâ facie* evidence on which to found a conviction to show that such milk so sent, sold, supplied or brought to a manufactory as aforesaid to be manufactured into butter or cheese or condensed milk, is substantially inferior in quality to pure milk, provided the test is made by means of a lactometer or cream gauge or some other proper and adequate test and is made by a competent person: Provided always, that a conviction may be made or had on any other sufficient legal evidence.

SPECIFIC NATURE OF DETERIORATION NEED NOT BE DESCRIBED.

8. In any complaint or information made or laid under the first or second sections of this Act, and in any conviction thereon, the milk complained of may be described as deteriorated milk, without specification of the cause of deterioration, and, thereupon, proof of any of the causes or modes of deterioration mentioned in either of the said two sections, shall be sufficient to sustain conviction. And in any complaint, information or conviction under this Act, the matter complained of may be declared, and shall be held to have arisen, within the meaning of "*The Summary Conviction Act*," at the place where the milk complained of was to be manufactured, nothwithstanding that the deterioration thereof was effected elsewhere.

APPEAL.

9. No appeal shall lie from any conviction under this Act except to a judge of a Superior, County, Circuit or District Court, or to the chairman or judge of the Court of the Sessions of the Peace, having jurisdiction where the conviction was had; and such appeal shall be brought, notice of appeal in writing given, recognizance entered into or deposit made within ten days after the date of conviction, and shall be heard

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tried, adjudicated upon and decided, without the intervention of a jury, at such time and place as the court or judge hearing the same appoints, within thirty days from the date of conviction, unless the said court or judge extends the time for hearing and decision beyond such thirty days; and in all other respects not provided for in this Act the procedure under "*The Summary Convictions Act*," so far as applicable, shall apply.

WHO TO GIVE EVIDENCE.

10. Any person accused of an offence under this Act and the husband or wife of such person shall be competent and compellable to testify.

APPLICATION OF FINES.

11. Any pecuniary penalty imposed under this Act shall, when recevered, be payable one half to the informant or complainant, and the other half to the owner, treasurer or president of the manufactory to which milk was sent, sold or supplied for any of the purposes aforesaid, in violation of any of the provisions of this Act, to be distributed among the patrons thereof in proportion to their respective interests in the product thereof.

## CHAPTER 32.

An Act to provide against frauds in the supplying of Milk to Cheese and Butter Manufactories.

[*Assented to 23rd March*, 1888.]

HER MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario enacts as follows;

NOTICE TO BE GIVEN WHEN MILK DILUTED, ETC.

1. No person shall knowingly and wilfully sell, supply, bring or send to a cheese or butter manufactory, or the owner or manager thereof, to be manufactured, milk diluted with water, or in any way adulterated, or milk from which any cream has been taken, or milk commonly known as "skimmed milk," without distinctly notifying, in writing, the owner or manager of such cheese or butter manufactory, that the milk so sold, supplied or brought to be manufactured has been so diluted with water, or adulterated, or had the cream so taken from it, or become milk commonly known as "skimmed milk," as the case may be.

NOTICE TO BE GIVEN WHEN "STRIPPINGS" KEPT BACK.

2. No person who in the course of his business sells, supplies, brings or sends to any cheese or butter manufactory, or the owner or manager thereof, to be manufactured, the milk of cows, shall knowingly and wilfully, in the course of such dealing and business, keep back any part of the milk known as "strippings," without distinctly notifying, in writing, the owner or manager of such cheese or butter manufactory, of his having so kept back such "strippings."



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NOTICE WHEN MILK TAINTED.

3. No person shall knowingly and wilfully sell, supply, bring or send to a cheese or butter manufactory, or the owner or manager thereof, to be manufactured, any milk that is tainted, or partly sour, without distinctly notifying, in writing, the owner or manager of such cheese or butter manufactory of such milk being tainted or partly sour.

PENALTY FOR VIOLATIONS OF SS. 1-3.

4. Any person who by himself or by his servant, or agent, violates any of the provisions of the preceding sections of this Act, upon conviction thereof before any justice or justices of the peace, shall forfeit and pay a sum of not less than $5 nor more than $50, together with the costs of prosecution, in the discretion of such justice or justices, and in default of payment of such penalty and costs, shall be liable to be committed to the common gaol of the county, with hard labor for any period, not exceeding six months, unless the said penalty and the costs of enforcing same be sooner paid.

RIGHT TO TEST MILK.

5. It shall be lawful for the owner or manager of a cheese or butter manufactory to require the owner or custodian of any cow or cows whose milk is being brought for, or supplied or sent to, the manufactory, to submit such cow or cows at his farm, or other premises, where such cows are usually kept, to such milk test, by persons named by such owner or manager, as may be necessary for the said persons to ascertain the quantity and quality of the milk of such cow or cows, on any day, and at such time on any such day as may be appointed by said owner or manager; and in case the owner or custodian of the cows refuses to so submit them, or obstructs in the execution thereof the persons engaged in making the milk test, or interrupts the test, or interferes in any way with the test, or the application of its result, he shall, on complaint before any justice or justices of the peace, forfeit and pay for every such offence a sum of not less than $10 nor more than $100, in the discretion of the justice or justices of the peace who may hear such complaint, together with the cost of prosecution, if so ordered, and in default of payment of such penalty and costs, shall be liable to be committed, by such convicting justice or justices of the peace, to the common gaol of the county, with hard labour, for any period not exceeding six months, or until said penalty and the cost of enforcing same be sooner paid.

RIGHT TO TAKE SAMPLES OF MILK.

6. It shall be lawful for the owner or manager of any cheese or butter manufactory, who suspects any persons of selling, supplying, sending or bringing milk to the manufactory, of any offence under this Act, to enter upon or to appoint some person or persons to enter upon, and such appointed person may enter upon the premises of the suspected person, with or without notice, and take samples of milk from the cow or cows, from which the supposed offender was or had been immediately before then procuring the milk or part of the milk so sold, supplied, sent or brought as aforesaid, and any such suspected person who obstructs or refuses to permit the taking of any such sample shall, on conviction thereof, be liable to a penalty of not less than $10 nor more than $50 with costs of the prosecution, and in default of

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payment thereof, shall be liable to be imprisoned in the common gaol of the county in which the offence has been committed, for a period not exceeding three months with hard labor.

EVIDENCE OF VIOLATIONS OF SS. 1-3.

7. For the purpose of establishing the guilt of any person under the first three sections of this Act, it shall be sufficient *prima facie* evidence to shew that such person, by himself, his servant or agent, sold, supplied, sent or brought, to be manufactured, to any cheese or butter manufactory, milk substantially below the standard of that actually drawn, or by the accused represented as having been drawn from the same cow or cows within the then previous week, provided the comparison or test is made by means of a lactometer and cream gauge, or by some adequate means of making the comparison.

APPLICATION OF PENALTIES.

8. Any penalty imposed under this Act shall, when recovered, be payable one-half to the informant or complainant and the other half to the treasurer of the local municipality in which the offence has been committed.

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*Detective Inspectors.*

It is but necessary that one or two men for the Dominion should be specially designated and equipped for the purpose of seeing that the provisions of these statutes are enforced. A wide publication of the particulars of a few convictions would doubtless prevent others from indulging in like dishonesty.

*Valuation According to Quality.*

For the second difficulty, namely, the need for providing an equitable basis for the distribution of proceeds from a factory, according to the true value of the milk or cream furnished, very little of a reliable nature has yet been done, except for creameries.

*Creameries.*

For creameries operated on the cream-gathering plan, the oil-test churn seems to provide for the equitable distribution of proceeds, according to the true value of the cream for butter-making uses. Where the whole milk is received, the Babcock apparatus for testing milk, or Fjord's controller, will enable the factory manager to value each quantity, according to its true butter-making qualities.

*Cheese Factories.*

The comparative value for cheese-making, of milk containing different percentages of fat has not yet been authoritatively settled. The percentage of butter-fat which it contains may not be a true and invariable index of its quality for cheese-making. It is expected that investigations along this line during the coming season will be undertaken under the supervision of this Department, to settle that question for the guidance of the cheese-makers. In the meantime, the instruments at the service of the cheese-maker—the lactometer, cream gauge, lactoscope, and pioscope—will enable him by an easily applied test to examine and compare the qualities of different milks with reasonable accuracy. The use of the lactometer and of Babcock's apparatus for indicating the percentage of fat would enable any cheese-maker to test 25 or more samples of milk accurately within one hour.



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## VIII.—A DISTINCTIVE CANADIAN BRAND.

### VOLUME OF TRADE.

The export trade in cheese and butter is a most valuable one to the farmers of Canada. In the article of cheese, the rapid extension of our export transactions may be seen from the following table. The shrinkage in the exports of butter is due to several causes. Not the least of these has been the substitution for genuine dairy butter, of butterine and other imitation compounds from other countries in the British markets. It can never be impressed too often or too strongly upon the attention of European consumers that our dairy products are all genuine and pure.

The exports of butter and cheese from Canada for five years have been:—

| | | 1885. | 1886. | 1887. | 1888. | 1889. |
|---|---|---|---|---|---|---|
| Butter | lb. | 7,330,788 | 4,668,741 | 5,485,509 | 4,415,381 | 1,780,765 |
| Value | $ | 1,430,905 | 832,355 | 979,126 | 798,673 | 331,958 |
| Cheese | lb. | 79,655,367 | 78,112,927 | 73,604,448 | 84,173,267 | 88,534,887 |
| Value | $ | 8,265,240 | 6,754,626 | 7,108,978 | 8,928,242 | 8,915,684 |

In 1889, fifty-two per cent. of the butter, and over ninety-nine and a-half per cent, of the cheese exported from Canada were sent to Great Britain.

The following return from the Board of Trade Returns of Great Britain for five years (ended 30th June) show the total quantities and values of these articles imported into Great Britain:—

| | | 1885. | 1886. | 1887. | 1888. | 1889. |
|---|---|---|---|---|---|---|
| Butter | cwt. (112 lb.) | 2,401,373 | 1,543,566 | 1,513,134 | 1,671,433 | 1,927,842 |
| Value | £ | 11,563,508 | 8,141,438 | 8,010,374 | 8,913,045 | 10,244,636 |
| Butterine | cwt. (112 lb.) | Included with butter this year. | 887,974 | 1,276,140 | 1,139,743 | 1,241,690 |
| Value | £ | | 2,962,264 | 3,880,327 | 3,268,313 | 3,655,061 |
| Cheese | cwt. (112 lb.) | 1,833,832 | 1,734,890 | 1,836,789 | 1,917,616 | 1,907,999 |
| Value | £ | 4,069,344 | 3,871,359 | 4,514,382 | 4,546,408 | 4,490,970 |

From these, it may be seen that Canada now furnishes to Great Britain 41 per cent. of the cheese and less than half of one per cent. of the butter which she imports from outside countries. The competition between the countries which are making a specialty of dairy farming, for supremacy in the British markets, is yearly becoming keener. Two factors, both of which are wholly within our own jurisdiction in Canada, can be made to bring the best of the trade to ourselves, and when we get it, they will enable us to keep it. In the competition for cheaper foods to sustain the great masses of wage-earners in manufacturing centres, the tendency is towards lower prices per pound for the several articles of diet. Further economy

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in their production would enable us to compete successfully with our producing and commercial rivals, especially in the matter of concentrated articles of food. That aspect of the subject has been treated of in other parts of this report. The other factor which will enable us to win greater success and maintain our place in foreign markets, is that of producing the very best quality of those things which we send abroad, and of guarding with jealous care our reputation for such, when it is won.

### CHEESE AS A FOOD.

Ignorance on the part of the masses of consumers concerning the relative place of cheese in the list of ordinary articles of diet, has prevented a more general and generous consumption of it. The expression "bread and cheese" is a phrase common in many countries to denote all that is required to sustain life in health and comfort. In our own country it is seldom used with any local signification. An opinion prevails among a great many of our citizens that cheese is not a wholesome food, that it is a rather expensive and dangerous delicacy or luxury. By some it is counted to be indigestible. The idiosyncracies of a few individuals may render it such in their experience; and those being usually the talkative persons in communities, their expressed opinions find currency, while the sheepish element in humanity reveals itself by following in a general throng, the leadership of the most self assertive, be that in a right or wrong direction.

Cheese is a most wholesome and nourishing food. It is comparatively cheap, convenient for use and, when good, is promotive of, rather than antagonistic to good digestion. The chief service of a diet to the people is to furnish those elements or materials which are required for the nutrition of the tissues of the body, and to supply heat or energy for the activities of life. These tissues have the power of appropriating, from food that has been swallowed, the elements which they require, and also of changing them into their own substance. Effete matter, that has served its purpose, is cast off. The serviceability of a food depends upon its adaptation to maintain in these tissues, an even balance between the processes of waste and reparation. The main substances required have been termed "*nitrogenous*," and "*non-nitrogenous*" or "*carbo-hydrates*" and "*salts*" or "*mineral matter.*" The proper proportion in which these can be taken with most advantage in food is 1 part of "nitrogenous" matter to 3½ or 4 parts by weight of "non-nitrogenous" matter. The following table, from Letheby, shows the relative quantities of these that are to be found in a few of the main articles of diet. They may be cited for comparison here:

| | Nitrogenous. | Non-Nitrogenous. | | | Salts. |
|---|---|---|---|---|---|
| | | Starch. | Sugar. | Fat. | |
| | Per cent. | Per cent. | Per cent. | Per cent. | Per cent. |
| Lean Beef | 19·3 | .... | .... | 3·6 | 5·1 |
| Fat Beef | 14·8 | .... | .... | 29·8 | 4·4 |
| Cheese | 34·59 | .... | 4· | 29·75 | 4·25 |
| Milk | 4·1 | .... | 4·4 | 3·3 | 0·7 |
| Bread | 8·1 | 47·4 | 3·6 | 1·6 | 2·3 |
| Potatoes | 2·1 | 18·8 | 3·2 | 0·2 | 0·7 |

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It may be calculated that cheese can give at least one and a half times as much nutrition per pound as ordinary beef. Then the sense of taste has power to stimulate the secretion of digestive fluids; and the pungent, agreeable flavour of well-cured cheese renders it a food easy of digestion, even to the extent of promoting the digestion of other foods that may have been consumed. The loss in beef for bone will be quite equal to 8 or 10 per cent., and when that is allowed for, the economy of buying cheese for at least a portion of the diet of an ordinary family may be easily seen. The trade in cheese in our home markets is capable of more extension, when those who cater for the public and those who furnish the cheese for home consumption have decided to change the present practice, which consists in the keeping of the "culled" or inferior cheese for the home trade.

### GUARDING OUR REPUTATION.

An extension in our foreign trade may also be made, mainly by maintaining the good quality and good name of the cheese which has been sent abroad, and by bringing up the quality and reputation of our butter to an equal standard of excellence. The guarding of our reputation for honest, pure, and fine dairy products, will enable us to lay a sure foundation upon which to rear a trade of ever-growing dimensions with the assurance of continuous profits. The markets must be suited; the particular class of requirements must be met; the preferences of those who purchase at the highest prices must be consulted and gratified; and our customers when once satisfied with our goods, must be retained by the protection of our own good name. Our reputation has been won after long and keen competition; and now if we allow it to become lost, our indifference will be inexcusable. It would be the very concentration of commercial folly to hold our national good name so cheap, that we will let it be risked by neglecting to take the steps necessary to protect it. Especially will that be so, since this will be neither costly to ourselves nor injurious to others.

When inferior cheese come from elsewhere through Canadian ports, the unsuspecting buyer in Great Britain, without any positive information to the contrary, supposes them to be of Canadian manufacture. In that case a prejudice is easily created and perpetuated to the injury of Canadian dairy interests. It is alleged and acknowledged that some foul compounds by the name of cheese have gone to Great Britain from the United States, and that too through our ports, without any designating mark to distinguish them from the pure cheese of Canadian manufacture. The following correspondence which has been taken from one of the official United States reports, sets forth the danger that exists :—

## "REPORT OF THE CQMMITTEE ON CHEESE, OF THE NEW.YORK PRODUCE EXCHANGE, IN RELATION TO "FILLED CHEESE."

"THE LIVERPOOL PROVISION TRADE ASSOCIATION AND EXCHANGE COMPANY, LIMITED.

"LIVERPOOL, January 8th, 1890.

"DEAR SIR,—The directors of this association respectfully wish to draw the attention of your government to the exportation from the United States to the United Kingdom of what is termed "filled cheese."

"This article is a compound of skim milk and grease, such as old butter, oleomargarine, or lard, the favorite ingredient being at present stale butter, on account of the belief of the manufacturers that they can thus defy the analyst.

"My directors believe that this product is exceedingly harmful to the dairy farmers of your country. It is not the natural product of the cow, known as cheese. It is a well known fact that, for the past five years, since this fraud has been practiced, the price of pure cheese, instead of advancing in the spring months, has steadily declined.

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"This product is neither wholesome nor palatable, but is injurious to the "American cheese trade, as it curtails consumption of the pure article, disgusting the "community with American cheese as an article of food.

"We believe the true remedy lies in prohibiting the production of filled cheese, "which is manufactured in the western states, chiefly in Ohio, Illinois and Wisconsin. "We are informed that New York state has prohibited its production.

"We ask you for your assistance in this matter, and trust you will not only put "this matter in the hands of the government, but suggest they should draw the "attention of the dairy associations and Governors of the various states where this "article is produced.

"Your obedient servant,

"J. L. HARMOOD BANNER,
"*Secretary.*

"THOMAS H. SHERMAN, ESQ., American Counsul, Liverpool."

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After passing through the regular course of official or diplomatic documents, that letter from the Secretary of the Liverpool Provision Trade Association and Exchange Company was referred to the New York Produce Exchange of New York City. By that body it was again referred to their committee on cheese; and by that committee the following report was made to the Produce Exchange, which received and approved of it on the 27th of February, 1890:—

"NEW YORK, February 26th, 1890.

"C. G. BURKE, ESQ.,

"*President New York Produce Exchange:*

"DEAR SIR—Your committee have the honor to acknowledge the receipt of the "several communications concerning the adulteration of cheese emanating from the "Liverpool Provision Trade Association and Exchange Company, Limited. The "subject has had full and thorough investigation which its importance demands. This "matter received the attention of the members of this exchange on February 23rd, "1887, upon which occasion the following preamble and resolutions were adopted:

"WHEREAS, Large quantities of cheese are being manufactured in some portions "of the western states from milk from which the cream has been entirely extracted "by the separator process, and other animal and vegetable fats substituted for the "butter so extracted; and,

"WHEREAS, These goods are being almost entirely exported to Great Britain "without being stamped or branded so as to distinguish their true character, and "which are calculated to deceive; and,

"WHEREAS, These spurious goods are working an injury to legitimate trade in "cheese; therefore, be it

"*Resolved*, That the cheese trade of the New York Produce Exchange deem it "their duty to expose and discountenance such frauds by every means in their power.

"*Resolved*, That we condemn the practice of adulterating cheese with animal or "vegetable fats as demoralizing, and tending to create a prejudice in the markets of "the world.

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"*Resolved*, That the attention of the dairy commissioners be drawn to the above "resolutions, with a request that they do all they can to enforce the laws in regard "to the make and sale of imitation cheese.

"Since then the vigilance exercised by the assistant dairy commissioners in this "city has put a stop to the trade in filled cheese in this market. Your committee "have communicated with the several dairy and food commissioners of the following "states, to-wit: New York, New Jersey, Ohio, Wisconsin, Iowa, Minnesota and Con- "necticut. The state of Illinois, as far as we can ascertain, has no dairy commissioner. "The letters received have gone into the subject thoroughly and fully, and we submit "extracts from these bearing on the subject.

"J. K. Brown, New York State Dairy Commissioner, under date of February "19th, says: "The statutes of this state do not in express terms prohibit the manu- "facture and sale of butter filled cheese. I am in favor of a national law, as well as a "state law; the former would reach many cases which the latter could not, and "whatever its provisions, they would be uniform, affecting all states alike. Any "legislation tending to stop the tampering with dairy products is of the utmost "importance, not only to the consumer, but to the producer as well, as it would help "to restore and maintain the confidence necessary to a normal consumption of the "product."

"Wm. K. Newton, New Jersey Dairy and Food Commissioner, under date of "February 17th, says: "I enclose a marked copy of the laws of this state relating to "food. You will notice that 'filled cheese' may be sold if the box is properly marked 'and branded 'imitation cheese,' and at the time of sale the purchaser must be "informed."

"Henry Talcott, Assistant Dairy and Food commissioner for Ohio, writes under "date of the 15th of February: "In answer to your questions: first, our law does "prohibit the manufacture of cheese out of any subtance but pure milk, salt and "harmless coloring matter; and I would punish a filled cheese manufacturer in Ohio "very quick if such a one could be found; second, I would most heartily approve of a "national law prohibiting it. Ohio is free from this stain of filled cheese."

"H. C. Thom, Dairy and Food Commissioner for Wisconsin, states, under date of "February 20th, that "the laws of this state do not prohibit the manufacture of filled "cheese when said filling consists of butter. The laws of the state demand the "branding only of full cream cheese. I am in favor of a national law that will pro- "hibit the filling of cheese in any way. We have made it so very warm for parties "in Wisconsin who have been filling cheese with low grade butter that the business "has been discontinued, and I feel safe in saying that not a pound of filled cheese is "being made in this state at the present date."

"H. D. Sherman, Iowa state dairy commissioner, writes under date of February "17th: "I this day send you by mail a copy of our state dairy law. As you will see, "it covers the adulteration of cheese the same as butter. I am most heartily and "emphatically in favor of a national law that will cover all kinds of the detestable "stuffed cheese. It is no better than oleomargarine, and should come under the same "law of control."

"Warren J. Ives, Minnesota state dairy and food commissioner, writes as follows: "February 19th. Our law does not permit the manufacture of filled cheese, even

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"though filled with butter. I most certainly approve of a state as well as a national "law with reference to filled cheese even more stringent, if possible, than the present "oleomargarine law."

"J. B. Tatem, state of Connecticut dairy commissioner, writes under date of "February 21st: "Our state has no law which applies to cheese. I believe that a "law similar to the oleomargarine law, so called, applied to cheese would prove a "benefit to both producer and consumer."

"From the foregoing it will be noticed that the laws of the states of New York, "New Jersey and Wisconsin do not prohibit the manufacture of cheese filled or "enriched with butter; while those of Ohio, Iowa, Minnesota, and we may add "Pennsylvania, prohibit filling of any kind.

"Illinois, we understand, has no statutes on this important subject, and from the "best information we can obtain, there are several firms manufacturing filled cheese "in that state, of nearly every size and shape adapted for the home trade and also for "export; the latter are being consigned and shipped by the manufacturers direct to "commission agents in Great Britain for sale; and, owing to more favorable rates of "freight, are shipped via Portland, Boston, Philadelphia and Baltimore, few or none "passing through this port. Regarding the quantity of filled cheese made in this "state, we are of the opinion that the quantity is very much smaller than in previous "years.

"While it is the opinion of your committee that this article may have merit as a "'cheap cut' when the price of best quality is high, and it has had strong scientific "endorsement in Europe. The manufacture of filled cheese is, we are informed, "carried on to a considerable extent both in Norway and Scotland. We would "certainly recommend the enactment of a national law regulating the manufacture "and sale of this article by the imposition of a nominal tax on manufacturers sufficient "to cover the expense incurred, and that the tax and supervision be imposed and "collected in the same form and manner as is now in force under the act regulating "the manufacture and sale of oleomargarine.

"We attach herewith the correspondence referred to, and also copies of the "different state laws as furnished to us, all of which is respectfully submitted.

"M. Folsom,
"W. E. Smith,
"S. W. Doty,
"Thomas Bamber,
"Alfred C. H. Froemcke,
"*Committee on Cheese.*"

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In the Dominion of Canada not a single box of "filled" cheese is manufactured; and yet our dairy interests are in danger of being damaged by these imitation or "filled" cheese coming into unfair competition with our wholesome product in the English markets. The following circular was received from the Liverpool Provision Trade Association and Exchange Company, limited:—

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## THE LIVERPOOL PROVISION TRADE ASSOCIATION AND EXCHANGE COMPANY, LIMITED.

"SECRETARY'S OFFICE, 24 NORTH JOHN STREET,
"LIVERPOOL, 26th March, 1890.

"DEAR SIR,—We desire to inform you that a Committee consisting of the "undersigned has been appointed by this Association to watch the interests of the "Cheese Trade, which are being seriously menaced by the continued increase in "manufacture of the article known as "Filled" Cheese.

"We desire to co-operate with you in the direction of obtaining such legislation "as will lead to the suppression of the manufacturing of this article.

"The legitimate interests of the 'Trade' are seriously imperilled, and the rea- "sonable expectation of the consumer disappointed, and we are clearly of opinion "that the distribution of 'Filled' Cheese is disgusting the British public with the "pure article, and that our Trade and mutual interests are in danger of suffering a "permanent and lasting injury.

"We are in communication with our Home Sanitary Authorities, and are plac- "ing the matter before our Agricultural Government Department, and Members of "the House of Commons.

"We venture to suggest that you should call upon your Government and State "Legislatures to prohibit the manufacture of these goods.

"We would ask you to inform us what steps are being taken on your side, and "what course should in your opinion, be adopted to bring about the end we have in "view.

"We await the favor of your reply.

"Yours faithfully,

"W. CARSON,
"A. W. DUNN,
"J. L. GRANT,
"C. HOLLAND,
"T. LONSDALE,
"SAMUEL WHITE,
"J. S. HARMOOD BANNER,
*Secretary.*

*Letter from Importer in England.*

A member of one of the firms in Liverpool which imports largely of Canadian products, wrote to his agent in Canada under date of February 13th, 1890, to the following effect :—

"In order to improve the value of Canadian cheese as a whole, it is necessary, "in the face of the present competition from the United States, to brand every "cheese as follows :—"Canadian Full Cream Cheese, being the whole product of "Pure Milk." This ought to be branded twice on the cheese itself and once on the "boxes. Every factory throughout the country should have a registered number "which ought also to be branded on the cheese. All factories where patrons were

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"found skimming, should be debarred from using this brand during such period or "for a certain length of time whilst skimming had been proven to have taken "place. It ought also to be suggested to the Government that all skimmed cheese "should not be allowed to be exported. As the matter now stands, the retailer can "place before the consumer a skimmed or margarine cheese as a finest Canadian, "because there is no check to such dishonest practices. Therefore, I consider, "Canada as a whole is not reaping what she should do in producing an honest "article, made out of milk which has not been tampered with.

"This matter ought to be brought before the Upper House this session and "become law before the new season starts. It is of vital importance to the dairy-"men and the buyers. We feel the competition of this wretched margarine cheese "very acutely. One of our neighbors sold on Tuesday last, 1,500 boxes of these "frauds, whilst we only sold 25 boxes of fine cheese. The reason is very easy to "get at. The retailers are greedy for profit; they buy these common cheese; sell "them at 6d per pound; drive the people off the consumption; and the best cheese "suffer."

*Resolution by Dairy Convention.*

The following resolution was passed at a cheese-makers' Convention held at Lancaster, Ont., on March 13th, 1890:—

"Moved by D. M. Macpherson, seconded by C. C. McDonald and carried "unanimously:—

"That, whereas, Canadian cheese made from full-cream milk has secured a good "reputation in England for its standard quality; and

"*Whereas*, some few skim-milk cheese are being made and shipped out of "Canada to the English market as whole-milk; and

"*Whereas*, a quantity of American cheese is being imported into Canada and "branded as Canadian make:

"*Be it resolved*, that steps be taken to ask the Federal Government to enact a "law permitting a mark to be put on all full-cream cheese made in Canada, as "'Canadian Full-cream Cheese.' And any person or persons putting such a mark "on skim-milk cheese, or United States cheese imported into Canada, be liable to a "penalty of not less than $100 or more than $500."

VIEWS OF DEPUTATION.

A deputation waited upon the Honourable the Minister of Agriculture on the 18th of April, 1890, and presented their views in reference to the branding of cheese from the United States, which passed through Canada in bond. Their recommendations might be mainly summed up as follows:—

(*a*). Cheese, before being shipped from a Canadian port, should bear a brand setting forth the name of the country where they were manufactured. It was pointed out that when cheese reach their destination on the other side of the Atlantic, they are supposed to be the product of the country from whose ports they had been shipped. The Bills of Lading on which cheese, that have been stored in Canada or warehoused in Montreal, go forward, are Bills of Lading dated from the Canadian shipping point. The cheese represented by such Bills of Lading can readily be sold as Canadian products, unless there be some distinctive and easily seen mark upon the cheese themselves and upon their boxes.

(*b*). It was urged that legislation should be enacted, providing for the putting of a distinctive Canadian brand on all cheese manufactured from pure whole milk,

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and that the dairymen should be protected in the use of that brand by an enactment rendering it a punishable offence for anyone to use that or a similar brand wrongfully.

ACTION TAKEN.

From these letters and documents which have been quoted, it is evident that the exportation from this side of the Atlantic of imitation or "filled" cheese is to the detriment of our trade in honest pure dairy products. Their quality damages the interests of the honest producers, by turning the consumption of the people towards other kinds of food; and Canada is made to share in the blame and condemnation from those who do not distinguish between the origin of products which are called "American." Since the name "America," includes Canada, United States, Mexico, Brazil, and several other countries, the trade and citizenship designation "American", seems a trifle too comprehensive to be exact or useful as a descriptive term for any one nation. *Hence, I take it that all cheese or other products similar in appearance to the products of Canada, which go from our ports to foreign markets, should bear a distinctive and easily recognisable description of their nature and also of the name of the country where they were made or manufactured.*

*Application of Statute.*

*The Merchandise Marks Offence Act*, 1888, seems to make adequate provision for the proper branding of products passing through or being offered for sale in the Dominion. I took occasion in July to bring to the attention of the exporters of cheese and butter, the matter set forth in the following communication:—

It will be remembered by those interested in the cheese trade, that an influential deputation of dairymen waited upon the Hon. John Carling, Minister of Agriculture, just before the close of the session of Parliament and laid before him some facts and suggestions in reference to the protecting of Canadian dairymen against loss and damage from the wrongful use by some shippers of the Canadian brand upon United States cheese going through Canada in bond. As the season when the shipment of these cheese through Canada is now at its commencement, the Dominion Dairy Commissioner, Prof. Robertson, is considering ways and means to carry into effect the provisions of the "Merchandise Marks Offences Act, 1888," in so far as they apply to the cheese and butter trade of Canada. It has been represented to the Department that small quantities of United States "filled cheese"—(made by the removal of the cream from milk, and the substitution of lard, cotton seed oil or other fats)—were carried through in bond last year, and left the ports of our Dominion with Bills of Lading dated from a Canadian place where they had been stored in bond. It has been alleged also that United States full-cream cheese, the products of the United States, have been shipped through our country, and have been branded by the shipper with a false trade description, representing them as cheese of Canadian make. In brief, the provisions of the Merchandise Marks Offences Act of 1888 that may be applied directly to the cheese and butter trade, are:

I. Any person who applies any false trade description to goods is subject to the provisions of the Act.

II. Every person who sells, or exposes for, or has in his possession for sale, or any purpose of trade or manufacture, any goods or things to which any forged trade mark or false trade description is applied, is guilty of an offence against this Act.

III. Every person guilty of an offence against this Act is liable:

(*a*) On conviction on indictment, to imprisonment, with or without hard labor, for a term not exceeding two years, or to fine, or to both imprisonment and fine; and

(*b*) On summary conviction, to imprisonment, with or without hard labor, for a term not exceeding four months, or to a fine not exceeding $100, and in case of a second or subsequent conviction, to imprisonment, with or without hard labor, for a term not exceeding six months, or to a fine not exceeding $250.

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(*c*) In any case every chattel, article, instrument or thing, by means of or in relation to which the offence has been committed shall be forfeited.

IV. The expression "trade description" means any description, statement or other indication direct or indirect:

(1) As to the number, quantity, measure, gauge or weight of any goods; or

(2) As to the place or country in which any goods were made or produced; or

(3) As to the mode of manufacturing or producing any goods; or

(4) As to the material of which any goods are composed.

V. The expression "false trade description" means a trade description which is false in a material respect as regards the goods to which it is applied, and includes every alteration of a trade description, whether by way of addition, effacement or otherwise, where that alteration makes the description false in a material respect; and the fact that a trade description is a trade mark or part of a trade mark, shall not prevent such trade description being deemed to be a false trade description within the meaning of this Act. A person shall be deemed to apply a trade mark, or mark, or trade description to goods who

(*a*) Applies it to the goods themselves; or

(*b*) Applies it to any covering, label, reel or other thing in or with which goods are sold or exposed or had in possession for any purpose of sale, trade or manufacture.

The probability is that such a watch will be kept on the imports and exports of cheese, that if any lot of United States cheese be found with a brand on the cheese or on the box representing that they are the product of Canada or Canadian in make, the offenders will be subjected to a rigorous prosecution for infringement of the statute.

*Action by Department of Customs.*

Subsequent to that, instructions were issued from the office of the Commissioner of Customs, at Ottawa, to the Acting-Collector of Customs at the port of Montreal, from which the following extract is made:—

"I beg to refer you to the Assistant Commissioner's letter of 15th August last, "and to inform you that I am now instructed by the Honourable the Minister of "Customs to say, that while the action in relation to the shipping mark placed on "the cheese in transit is all right in most respects, it has been decidedly wrong in "the use of the words "American Produce," and instead of these words, the marks "should always be "Produce of the United States;" the former marks are liable to "misinterpretation in the English markets. The people in the United States have "no more claim to the term American than parties of other countries on this conti-"nent."

"I have therefore to instruct you, to order to be used, the words I have mentioned in substitution for the words you have been in the habit of using."

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RECOMMENDATIONS.

In view of the practices that have been in vogue in the past, and of the present condition of the dairy trade, it seems most desirable that enactments should be made, providing for the branding of cheese of Canadian manufacture in such a way that they may be distinguished easily from the product of other countries, and also that that distinctive brand shall be evident to the buyer, whether he seeks the information or not.

I would suggest that every manufacturer of cheese from pure whole milk containing not less than 3½ per cent. of butter fat should be entitled to use on such product a brand, such as "Canadian Full Cream Cheese." The use of the brand might

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be entirely permissive; but its use should also be prohibitory, except to factories making cheese of that description. A penalty for the wrongful use of the brand should be inflicted to the extent of $20.00 per box of cheese for every instance where it was wrongfully applied.

Then each cheese factory should be entitled to a registered number. Brands of uniform style, and the registration number should be furnished from the Office of the Dairy Commissioner for the Dominion. The complete brand may take a form similar to the following:—

CANADIAN
FULL CREAM CHEESE.
Factory No. .

Many advantages would accrue to the honest dairymen from the adoption of this plan. The product of each factory might be followed or traced back from the retailer's counter to the factory where it was produced. Those factories which turn out the very best quality would reap an undoubted advantage directly; and the difference in price which would thereby be created, as between fancy quality and common goods, would help very much to improve the quality of all our factory products, and consequently to strengthen our reputation and hold upon the British markets. Doubtless for a time, some of the cheese buyers and cheese exporters would oppose the use of the brand. When a retail seller of cheese in an English town or city finds that his customers are pleased with the quality of a certain brand, he will want the product of the same factory again; and he will want it badly enough, to pay a relatively higher price for it than for others. The wholesale house from which he buys his supplies, may instruct their importers or agents on this side, to secure the product of that or those factories at even an advanced price, because of the active and persistent demand for it by customers who are in the retail trade. Thus a keener competition for the goods of the best factories, and a marked difference in the prices paid for different qualities, would result. Both of these would be very much to the advantage of the dairymen who patronise the cheese factories.

An immediate advantage would also accrue by the preference which Canadian cheese under our own national brand would receive in the English markets. It would be a guarantee to the consumer that there was no fraudulent imitation under its cover.

The finest English and Scotch cheddar cheese are still sold wholesale in many instances for 4 cents per pound higher than the Canadian cheese. Yet Canadian cheese, by some of the magic of commerce, are to be found on the counters in the best retail provision shops, doing duty at the highest prices for English and Scotch Cheddars. Our cheese are wanted because of their own quality; and our own brand upon them, as CANADIAN would bring to our own people, part of that wide profit which now stays in the retail or wholesale merchants' hands, in the difference between the prices paid for Canadian cheese as such without brands, and the prices paid by the consumers of the same cheese when it is furnished to them as finest "English Cheddar" and "Scotch Cheddar."

The use of this brand need not be compulsory; but I think nine-tenths of the factories in the Dominion would adopt its use, if assurance were given to them that they would be protected against a wrongful application of the brand upon goods not entitled to be so described.

It is hoped that our export trade in butter will from this time be put on a better footing, by the manufacture of fresh-made butter during the winter months to meet the demands of foreign markets. From the very commencement of that trade, it will be to our advantage to have a distinctive Canadian brand, lest our fancy cream-

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ery butter should suffer from misrepresentation. A distinctive Canadian package in the form of a cask would also tend to give us a place in those markets.

Hence, it seems desirable that a brand

CANADIAN
CREAMERY BUTTER.
Factory No. .

should be available for use on creamery-made butter. Similar protection should be afforded to those using it to that which is given in the use of the brand "Canadian Full Cream Cheese." A registered number for each creamery would also be a service to the butter-makers and also to the general trade in dairy products, both for home and foreign markets.

## IX.—BOARDS OF TRADE.

### SYNOPSIS OF THE PROVISIONS OF THE ACT, R.S.O. CHAP. 130, RELATING TO THE INCORPORATION OF BOARDS OF TRADE (WITH FORMS.)

Any number of persons not less than thirty, who are Merchants, Traders, Brokers, Mechanics, Manufacturers, Managers of Banks, or Insurance Agents, and residents of any district which has a population of not less than two thousand five hundred persons, may associate themselves together as a Board of Trade, and appoint a Secretary.

The persons so associating themselves together as a Board of Trade shall, under their hands and seals, make a certificate specifying the name assumed by the association, and by which it shall be known; also the name as defined, of the district in which the same is situate and its business transacted, and the name of the person by them appointed Secretary to the said Board of Trade.

Such certificate shall be acknowledged before a Notary Public, Commissioner for taking affidavits, or Justice of the Peace, by the Secretary of the said Board of Trade, and shall be forwarded to the Secretary of State, who shall cause the same to be recorded in a register to be kept for that purpose; and a copy thereof, duly certified by the Secretary of State, shall be evidence of the existence of such association.

The expression "district," unless the context otherwise requires it, means the city, county, town, village or judicial district, within and for which a Board is established under the Act.

The expression "Board of Trade" includes Chambers of Commerce.

With the certificate, the applicants must transmit the fee of five dollars to the Secretary of State; and such fee must be paid in cash, or by an accepted cheque, made payable to the order of the Honourable the Secretary of State, and should, if sent by mail, be transmitted to him in a registered letter.

#### FORMS.

*Form of Certificate of Association.*

Know all men by these presents, that we, the several persons whose signatures and seals are hereunto subscribed and set, and whose occupations are set opposite our respective signatures, do hereby declare that we have associated ourselves together as a Board of Trade, under the provisions of Chapter 130, of the Revised Statutes of Canada, intituled "An Act respecting the Incorporation of Boards of Trade."

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The name by which the said Board shall be known is "The ..... ....."

The name of the district in which the same is situate and its business transacted, is the district of.....which has a population of not less than two thousand five hundred persons.

The name of the person appointed as the Secretary of the said Board is .....of the..... .....of..... in the County of.....and Province of.....

As witness our hands and seals this.....day of..... ..... A.D., 18 .

| Witness. | | Name. | Occupation. | |
|---|---|---|---|---|
| ..... ..... | 1 | ..... ..... | ..... ..... ..... | [L.S.] |
| ..... ..... | 2 | ..... ..... | ..... ..... | [L.S.] |
| ..... ..... | 3 | ..... ..... | ..... ..... | [L.S.] |
| ..... ..... | 4 | ..... ..... | ..... ..... | [L.S.] |
| ..... ..... | 5 | ..... ..... ..... | ..... ..... | [L.S.] |
| ..... ..... ..... ..... | 6 | ..... ..... | ..... ..... | [L.S.] |
| ..... ..... ..... ..... | 7 | ..... ..... | ..... ..... | [L.S.] |
| ..... ..... | 8 | ..... ..... ..... | ..... ..... ..... | [L.S.] |
| ..... ..... | 9 | ..... ..... ..... | ..... ..... | [L.S.] |
| ..... ..... | 10 | ..... ..... | ..... ..... ..... | [L.S.] |
| ..... ..... ..... | 11 | ..... ..... ..... | ..... ..... ..... ..... | [L.S.] |
| ..... ..... | 12 | ..... ..... ..... | ..... ..... ..... | [L.S.] |

In the matter of the Incorporation of The ..... Board of Trade.

1. .....of the.....of..... in the Province of..... , .....do hereby acknowledge and declare that the certificate hereto annexed was signed and sealed (in my presence) by the respective persons by whom it purports to have been signed and sealed, and that their occupations are set opposite their respective names, and that all the said persons reside within the said district of..... which has a population of not less than two thousand five hundred persons.

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2. That I am the duly appointed Secretary of the said "The ..... Board of Trade."

As witness my signature,

..... ....

Taken and acknowledged before me
at the... ..... .....of.....
in the.....of.....
this.....day of.....
A.D. 18 .

.....

(A Commissioner, or Notary Public, etc.)

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DAIRYMEN'S BOARDS OF TRADE.

The establishment of Dairymen's Boards of Trade, at different places, each convenient of access to the representatives of factories in a large district, has been of undoubted benefit to the dairy interests. In order to promote the formation of these very useful commercial institutions in other sections, where as yet they do not exist, the following set of Articles and By-Laws has been prepared. A careful reading of them, will enable those who are concerned in the marketing of dairy products to understand the nature of the service, which these Boards of Trade are designed to render.

The practice of having cheese sold by auction at the Board of Trade meetings has been introduced in a few places. At Brockville, Ont., this practice was first adopted in Canada, and I am informed that it has given almost general satisfaction to the *salesmen* and the *buyers*. Butter has not yet been marketed in Canada by the auction method, but it seems the business-like way of effecting the transactions in all products which have been "boarded" for sale. The old-fashioned manner at cheese and butter markets was more like the conduct of children than that of experienced business men. Offers were made under the solemn pledge of secrecy—to be broken within a few moments—and fair square open and above-board transactions were discouraged, lest the prices that had been offered, accepted, or refused, should influence some other seller or buyer to withdraw his *goods* or his *bids*.

ARTICLES OF ASSOCIATION.

1. This organisation shall be known as the "Dairymen's Board of Trade of..... ....."

2. Its officers shall consist of President, First Vice-President, Second Vice-President, Secretary-Treasurer, and.....Directors. These officers shall constitute a Board of Management; and any five of them shall constitute a quorum for the transaction of business.

3. The officers shall be elected to hold office for one year and until their successors are elected. Vacancies occurring during the year, may be filled by election at any regular meeting of the Board of Trade.

4. The payment of an annual subscription of.....to the Secretary-Treasurer shall constitute an individual membership for one year.

5. A membership ticket, entitling any *salesman* to be admitted to the privileges of the Board of Trade, shall be granted by the Secretary-Treasurer on the payment of an annual fee of.....for each cheese factory or creamery which is represented by him.

6. All *buyers* shall be entitled to all the privileges of full membership in the Board of Trade, without the payment of an annual subscription.

7. Members only shall be entitled to vote.

8. Members shall be entitled to all the privileges of the salesroom, and to the information obtained from other markets or other sources by the Secretary-Treasurer in his official capacity; but it is to be understood that when a factory has more than



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one *salesman*, only one shall represent that factory and act for it at any meeting of the Board.

9. It shall be allowable for a member of the Board of Trade to be accompanied in the salesroom by a friend, who is not actively interested in buying or selling the goods offered on the Board; but it is to be understood that this is granted as a matter of courtesy, and any violation of good faith will be considered and held to be a breach of the rules of the Board.

BY-LAWS.

1. Only members, duly qualified according to the articles of the Board of Trade shall be entitled to the privileges of the salesroom.

2. A register shall be kept and a bulletin board shall be placed in a conspicuous place in the room, upon which shall be displayed all the telegrams and other information which has been received, and to these all members shall be entitled to free access; they shall also have the privilege of posting upon the same register and bulletin board a notice of any dairy or other produce which they may have for sale.

3. It shall be the duty of the Secretary-Treasurer to procure information from other markets by telegram or cable and to post the same promptly upon a conspicuous place in the salesroom; he shall also receive the fees for membership and issue tickets of membership, and under the direction of the President shall have the general supervision of the salesroom.

4. The President shall have the power to cause to be expelled from the salesroom any person who is not entitled to be there in his right as a member, and to eject any member or non-member for a breach of the rules of the Board.

5. Every meeting of the Board of Trade shall be called to order by the President or Vice-President at the hour of....o'clock, or at such other hour as a majority of the members from time to time appoint.

6. The regular meetings of the Board of Trade shall be held upon..... .....of ..... .....week in the month.

7. As soon as practicable after every meeting is called to order, the President or some other person appointed by the Board of Management for that purpose, shall offer for sale to the highest bidder such lots of cheese or butter as any *buyer* shall select.

8. All *buyers* who bid for a selection of the cheese or butter offered on the Board, shall make their bids publicly, and shall state the quantities which they are willing to take at the price offered.

9. As soon as the President or acting auctioneer shall have declared a *buyer* entitled to make his selection from the Board, the said *buyer* shall proceed immediately to publicly name the lots or quantities which he will take at the price offered, and every *salesman*, as the name of the lots which he represents and is entitled to sell is called, shall accept or refuse the offer which has been made.

10. When two or more *buyers* make an offer at the same time, the President or acting auctioneer shall at once decide whose offer shall have the preference.

11. A *salesman* shall have the right to decline accepting any offer even although it be the highest bid which has been made, if the conditions of delivery and payment be not satisfactory to him. And a refusal to accept the first or any offer will not debar a *salesman* from accepting the same or any other price from the same or another buyer.

12. There shall be no private buying or selling, or public buying at private terms of cheese or butter, which has been registered on the Board, from the time when the same is called to order until it is closed for that day.

13. All transactions on the Board shall be considered as cash transactions. The cheese shall be paid for on delivery, unless otherwise agreed upon between the *buyer* and *salesman*.

14. All bargains between members made at the salesroom or elsewhere, verbally or otherwise, shall be considered binding upon both parties thereto and shall be

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carried out by each, and a failure of either party to perform his or their part, shall be considered sufficient cause for the expulsion from the Board of Trade or salesroom of the party or parties so failing to perform his or their part.

15. The *salesman* whose name appears on the bulletin board shall be held to be the *salesman* of the factory for that day, and his action shall be binding upon the other salesman (if any), of that factory.

16. It is to be understood and agreed that all goods, so far as weights and quality of the same are concerned, shall be subject to the inspection of the *buyer* at....., unless inspected and accepted by the *buyer* at the point of delivery which may be agreed upon between *buyer* and *salesman*.

17. The "*leading price*" shall be the average price of the three lots which have been sold highest; and the "*ruling price*" is to be considered as the price at which the greatest number of lots shall have been sold.

18. A Board of Arbitration shall be constituted for the purpose of hearing, adjusting, and settling all differences which may arise between buyers and sellers from time to time, and it is expressly understood and agreed by and between the members acting on the Board of Trade, that judgments or awards by a regularly appointed Board of Arbitration shall be final and shall be adhered to. The said Board of Arbitration shall be chosen and constituted as follows:—

In case of a difference or differences between two parties or interests, the said parties or interests shall each choose one member of the Board of Trade; the two members thus chosen shall select a third member; and these three shall constitute a Board of Arbitration and shall have appropriate jurisdiction. In case the two members, who are chosen on such Board of Arbitration, fail to choose a third member of such Board of Arbitration, then the President of the Dairymen's Board of Trade shall appoint a member to act in conjunction with them, and the decision of such Board of Arbitration shall be final.

19. In case of any dispute arising, the parties or party who considers himself aggrieved must make complaint to the Secretary-Treasurer of the Board of Trade, within two weeks from the date agreed upon for the delivery of the products; and in all cases of action by the Board of Management or the Board of Arbitration, the party or interest against whom the decision is rendered shall pay all necessary expenses incurred by such action.

20. Any apparent or alleged violation of these by-laws shall be considered a sufficient reason for the appointment of a committee by the Board of management; such committee shall look into and take cognizance of the facts concerning such apparent or alleged violation and shall render a report setting forth what action they recommend to be taken by the Board of Trade in reference thereto.

21. Any amendments or additions to these Articles of Association and by-laws may be made at any regular meeting of the Board of Trade by a majority of votes, providing notice of the proposed amendments shall have been given at a previous regular meeting.

Officers for 1891.

President..... .....
First Vice-President..... .....
Second Vice-President..... .....
Secretary-Treasurer..... .....

Directors.

..... ..... ..... .....
..... ..... ..... ..... ..... .....
..... ..... .....

.....



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## X.—EXPERIMENTAL DAIRY STATIONS.

The value of all experimental work is two-fold. Every act of investigation has in itself, a double power of service. It is competent to discover what was before unknown and unrecognised; it is also capable of imparting information and instruction by illustration and demonstration. To farmers and the manufacturers of dairy products, the main value of experiments is not from discovery but from tuition; most of them are so far behind the leaders in knowledge and scientific practice, that they are in need of the helpful guidance which can be given by illustrations of how the well known truths can be applied in practice to their own business with most advantage to them. Hence Experimental Dairy Stations, while providing for the carrying on of the work of original investigation, should also be centres whence reliable and authoritative instruction in the best practices should emanate. A further value would come from repeated demonstrations of the results that arise from different methods and practices; and by these even the manufacturers who are indifferent about the extension of the interests of Dairying in Canada would be helped.

The following are the suggestions of a memorandum which I had the honour to submit for your consideration on 5th January.

### THE NEED FOR THEM.

I. The magnitude of the dairy interests of Canada is unequalled by any other single branch of agriculture or manufacture in the Dominion. The success of the cheese trade in Ontario and Quebec has been satisfactory to the farmers. The other Provinces, in many respects, are as well adapted for the prosecution of this industry, but a little outside encouragement is needed to set it going in them.

I would cite the case of Prince Edward Island, which is admirably suited for the development of dairying upon a large scale. Over twelve years ago several cheese factories were established; they were managed with such ill success that now the farmers are doubtful as to whether there is not some inherent condition in their situation, soil, cattle or circumstances, which prevents them from succeeding.

A branch Experimental Dairy Station there would serve for direction, illustration and demonstration, and thus help both manufacturers and farmers.

II. Besides, the milk from cows in Quebec, is different in quality from milk in Ontario. Investigations into the best methods of carrying on the business in each of the Provinces would furnish valuable guidance for the dairymen of each. As an instance of the need of this, let me refer to the experience of one brief trip to the Saguenay district last summer. One cheese-maker drove 60 miles to receive one day's instruction from me at a factory at Ha! Ha! Bay. His patrons reported afterwards that the cheese from his factory sold for one cent per pound relatively higher than they did before. A branch Experimental Dairy Station could be visited at least once a year by large numbers of cheese-makers.

### THEIR OBJECT.

III. Again the instructors of the cheese-makers in the several Provinces would acquire uniformity in their methods, from having the privilege of visiting these stations. That would do away with the differing qualities and the names—as "Ontario Cheese," "French Cheese,"— and give us a better reputation for uniformly fine "Canadian Cheese."

IV. Then the manufacture of small, fancy varieties of cheese, which are in great demand in England—as well as in home markets—could be introduced into Canada through these Experimental Stations. A few trial shipments of these to foreign markets, would furnish useful data for the guidance of dairymen and the promotion of trade.

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V. Moreover farmers in many sections are now beginning to turn their attention to winter dairying. The export butter trade of Canada has almost clean gone from us, and in my opinion the only way to build up a large trade in butter is to encourage the manufacture of it during the winter.

No endeavour will be made, or should be made to displace the cheese industry by a butter one. Our country is exceptionally well fitted for the production of cheese during the summer, even if not so well situated as many other competitive countries for the production of butter for export during that season. It appears to me quite possible to develop the butter-making industry during the winter months to as great a magnitude, and that with more remunerative profits to agriculturists, than those which arise from summer dairying in cheese-making. The possibilities of cheap and suitable winter feed by the use of ensilage, have been so well and satisfactorily demonstrated, that now milk can be produced at less cost during the winter than upon pasture only during the summer. In the winter season, the average price of butter is almost twice as much as during the summer. Safe transportation can be economically provided for during the cold weather.

VI. The buyers in England hardly know what fresh-made Canadian creamery butter is like. The quantities exported are often stale before they reach the consumer. That fact led the members of the Dominion Dairy Convention in Ottawa last year to pass a resolution, urging upon the Government the desirability of making a provision of at least $5,000 for the purpose of making weekly shipments, with a view to opening up this trade.

The Danish Government supervised the shipments of butter for a considerable period; and one of the Australian Governments gives bonuses now to promote shipments.

VII. These branch Experimental Dairy Stations would encourage the farmers to furnish milk during the winter season, and also provide small quantities of finest butter to be used as trial shipments for introducing fresh-made creamery butter to foreign markets.

Butter has been carried by the Canadian Pacific Railway across our continent to Asiatic markets, and Canadians ought to be able to supply those markets.

The West Indies offer many markets that might be secured to Canadians by the making of a few trial shipments in specially adapted packages. The publishing of the results of these would furnish valuable commercial data, and the enterprise of commerce would do the rest.

THE PLAN.

VIII. The plan is a feasible one, and well within the usual policy of Governments in looking after the interests of the farmers, and the foreign as well as the domestic trade of Canada.

IX. Branch Experimental Dairy Stations should be organised in the several Provinces for the stimulation and guidance of dairy farmers. Through them it would be practicable to spread acceptable information as to the best practices. Everyone would be welcome to visit and learn. Frequent publications of bulletins on the results of experiments, would keep them before the public, and that within a few months from their establishment.

X. New, small, and fancy varieties of cheese would be made.

XI. Investigations under the direction of the Dairy Commissioner would be made; and some of the cheese would be brought to the curing room in the dairy building at the Central Experimental Farm to prosecute enquiries into the causes of bad flavour in cheese, which is becoming a menace to the success of the trade in recent years.

XII. Butter would be made at the Stations, particularly during the winter, for use as already indicated,—viz., to promote winter dairying among farmers and to facilitate the getting a foreign demand at high prices for Canadian butter.

(I put this illustration in here. At the Colonial and Indian Exhibition in 1886 I had charge of over $10,000 worth of butter and cheese sent there by the Provincial

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Government of Ontario. The fresh-made creamery butter was sold to take the place of Danish butter, and during intervening years I have had enquiries for such butter from importers, who state that they will pay the Danish price for quality similar to what they received then. Presently and up till now no provision has been made for promoting the commerce in butter.)

XIII. I would suggest that suitable cheese factories or creamery buildings be rented by the year in the several Provinces. A guarantee by the Dairy Commissioner could be given to the farmers who furnished milk, that they would receive for it, a price equal to or slightly higher than the average price realised from neighbouring factories.

XIV. The location of the Experimental Stations need not be permanent in one district in any Province. After serving one district for a year or two, the Station could be transferred to another; and after several years' work, if the Stations had fully served the purpose of their existence, they could be discontinued, and the plant in each could be disposed of.

XV. The Imperial Parliament gives a grant of £5,000 sterling for the support of similar Stations and instruction.

XVI. This is a most opportune time for the establishment of these stations.

Recent occurrences, that have interfered with commerce, have directed the attention of farmers to the possibilities of making farming pay better, by new methods and the acquisition of new markets. The time is ripe for leading the farmers in the right direction.

These Stations would be very useful and exceedingly popular with the agricultural classes. If provision is made for their establishment, no effort will be spared to make them realise more than has been set forth in this brief memorandum.

## XI—BUTTER-MAKING IN WINTER.

The following is the Report of an address which I delivered at the Annual Convention of the Creameries Association of Ontario which was held at Berlin Ont., January 13th and 14th, 1891.

MR. PRESIDENT, LADIES AND GENTLEMEN. I have been very much gratified this morning by being driven around the streets of this thriving town of Berlin. We people who spend most of our thought and nearly all of our time, in trying to provide food for the working people,—who in turn furnish other things that we need,—too often forget that the prosperity of our country depends not alone on the success of our farmers, but on the thrift and enterprise of those men who even make the buttons for the farmer's coats, the shirt for his back, the shoes for his feet, and all those other things which we have seen in process of manufacture this morning. Yesterday I told a friend of mine that the population of Berlin was about six thousand, and I felt that I had been stretching; but now I find you have nearly eight thousand people and that your throbbing manufacturing enterprises enable you to make every township and county in Canada pay their tribute to you, because your goods go from one shore of the continent to the other. I want to say in this connection that the closer the bond of sympathy between people working in towns, and those who work on farms, the more will they be able to help one another, and to enjoy even privileges. Very often the countryman thinks the townsman is a man who waits to take advantage of him at every turn; and the townsman often thinks that the countryman is a fit subject to be skinned down close every chance he gets. When we know each other better, we will be able to work together more harmoniously for the advancement of the many interest of our one Dominion.

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This morning I will speak to you upon one aspect of a matter which may promote our common happiness and prosperity,—that of making more and better food in the winter time. The task and occupation of the farmer is to devote his talent and strength to solve those problems that face him, in such a way as to bring back from nature, as much as possible of all kinds of food which contribute to the support of the race to which he belongs. Now, a man who follows dairy farming and provides food for the people during the summer months only, is like a man who owning a button factory, shuts it up for the winter saying, "Closed because the weather is cold." With all the plant idle, all the hands discharged, no income throughout the winter months, he could never compete with another button manufacturer up in Port Elgin who runs his factory all the year round. No more can a farmer in Waterloo, who does a profitable business for only half the year compete with a farmer over in Wisconsin or in England, who keeps going all the year, and has an income in every month of it. Winter dairying has nothing in itself that is hostile to summer dairying any more than shirt-making in winter has in it anything that is hostile to shirt-making in summer. Perhaps you make a different class of goods; that is all. At the same time, business should run the year round in both instances.

Farmers have come to this experience in their calling, that their profits are threatened with annihilation. Times are hard,—there is no questionabout it—times are hard upon the farmers whose profit-producing occupation lasts only half the year. Times are not hard in Ontario with farmers who keep their business going and sell their products in the summer time, and fatten and sell steers and other stock products in the winter and spring. These men have been doing well during these past ten years, even if times were hard. A dairy man who has no fat steers to sell, can do something else. The point is can we begin winter dairying without much further outlay? A Creamery Association is an organisation which should take hold of this new problem and help the farmers to solve it. A man who runs a Creamery for only five months in the year will find his patrons becoming thoroughly dissatisfied with the receipts from their cows. It cannot pay a man to feed cows for twelve months from which he obtains cream for only five months; and the man who runs a creamery can never afford to make a profit out of the losses of his patrons. Put that down as a solid fact. And the man who furnishes skill and helps to make the profit of his patrons larger, will get a larger share for himself. If a man, running a creamery, will try and extend the manufacturing season for a few months more, he will find he will get so little cream that the running expenses will run away with the profit. You cannot begin to practice winter dairying in creameries, until you educate the farmers to feed their cows so that they will give milk during the winter. You need to begin at the foundation, and educate the farmers to feed their cows so that they will give milk, and send it to the creamery. Then when they have abundance of pay coming in regularly all winter, they will have money to pay their current expenses. It will not take all the summer to pay the accumulated grocery bills of winter; but they will be ahead in the spring and the summer will leave them more profit. I have said that much by way of preface, to try and remove any misconception that winter dairying has any hostility in it to summer dairying.

Now, put this down as my second proposition, that the price of butter in the summer time is one factor in a farmer's business over which he has almost no control. One man, twenty men, fifty men, five hundred men, can never by any manipulation raise the price of creamery butter in summer by one cent a pound. But creamery butter fresh-made will sell, on the average, throughout the winter, for about a half more per pound than it will from June to September. A man has exclusive jurisdiction over that factor. He can make creamery butter from June to September and take the prevailing price then, or he can make it from September to April and get the prevailing price then.

Then put this down as my third proposition, that the man who lets his cow go dry for five months of the year, will get less during each of these seven months when she does milk, than will the man who makes his cow milk, not seven but ten months of the year. Men say if they milk their cows all winter, they will get a

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smaller flow in summer. As a matter of fact, they will get a larger flow during the summer months. A cow that goes dry in the winter time—that is fed upon dry feed, will have her system so ill-adjusted for milk-making that she will give less milk in the summer. Take these charts now. I will take the Jersey cow, not because she is the best cow, but because the ideal form is easier described on this contour. The form of a cow's body will reveal both its capacity and power for making milk to the eye of the skilful judge. She is a milk-making machine, adjusted even in regard to the economical contrivance of her body for appropriating bulky food here, (the mouth), coming out in the concentrated form of milk at this end (the udder). Now if allowed to become dry, she may not be so well developed there (the udder) and in a short time you will find that she drops off in her milking, because she is not developed into the form for giving milk. In your heifers, the first season, develop these parts of the body, and thus make your means better adapted for carrying on your work. Let me give you the points of a cow, and show how she can be assisted for the enlargement of her capacity for winter dairying. Beginning at the most valuable one, you know a large udder is desirable and the points of excellence are first length, then breath, then elasticity—softness of quality. This is a very peculiar and mysterious laboratory wherein the cow changes the blood of her system into the milk she gives the dairyman. The next point to look for is a soft mellow skin. Any one knows that a steer will thrive better if he has a soft mellow skin. A man who feeds his cow during the winter on succulent feed, discovers that his cow has a skin more mellow, soft and unctuous. The skin is a most important organ, which goes around and through the cows body, the main interruptions being in the stomach. The digestive action depends upon the activity of the internal lining of this canal, in pouring juice upon the food in the stomach, and then in assimilating the food after it is partially digested. Any treatment that will make the outside skin more mellow, more moveable, will give you a better cow. The next point is a large barrel with ribs broad and wide apart. By the use of bulky and nutritious feed, you will develop and conserve the digestive power and augment its potency. A cow that lives all winter on straw, will find in the spring that she has been reduced so much in her productive capacity, having had to wrest nutrition from this straw, that she has got into the habit of wasting things. That cow won't give so much milk all summer. Then a cow needs to have broad loins and long rumps. You cannot change this part arbitrarily, it is born in the cow; but you can do this. If you keep on developing the milking qualities of any cow, you will find that her progeny—her calves—will very soon have the long rumps and broad loins. Then you will have better bred animals for giving milk. The cow should have a rather long fine neck, fine quiet face, with large eyes. Did you ever see a cow with a short thick neck that milked a long time? I do not think I can recollect a beefy necked cow that gave milk for a long period. The object simply is to show that a man by giving the cow some chance will develop in her, just the form that will help her to give the largest possible quantity of milk for the longest possible period. It is a good practice, because it is in accordance with a man putting himself into harmony with the laws of the universe, which when he does that, will shower blessings on him every time.

The cows that milk through the winter or ten months in the year, will give more milk per head than cows that give milk for six or seven months only; and when a man gets more milk per head, he will find that he has larger profits and then he will keep more cows. I will repeat what I said yesterday, that I think that every dairy man who has a hundred acres of good land should keep at least twenty five good milch cows. Now, how will he get the cows? The trouble is if he milks only in the summer time, he will not raise many calves. You will find this all over the country, the man will raise the winter calf seven out of eight times. I would not advise a man who has twelve cows to buy thirteen more, but by having winter calves, if he will rear these, in three years time, he may have twenty five cows.

I would have crops adjusted to feed those cows, by growing corn and filling silos. In that way I would put myself down as saying that every cow in each year should earn at least $50.00 on an average. One man down near Brampton for three con-

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secutive years, by making butter and selling it in Toronto, had receipts averaging $73.00 per head. He had $72.00 one year and $75.00 another. This was from twenty-eight cows. He had private customers and sold butter at twenty-eight cents per pound. Then not merely will you have more cows for milking. Half of the calves are bull calves. Well, why should the farmer kill his bull calves. when all the year round people are clamouring for beef of good quality. I remember a story of a man who suggested that the beef should be graded as they grade wheat in Manitoba. This man got a piece of an old ox and tried to cut it; but the knife and the beef seemed to be ill adapted to each other to the end of bringing about separation. He suggested to the proprietor of an hotel that if they graded their beef as they graded their wheat, this should be graded as number one hard." If calves are raised through the winter they can be fattened rather more rapidly, coming into the market in capital shape when they are two years old; and the dairyman who grows lots of corn can fatten lots of steers and add income in the spring in this manner, to summer and winter dairying. I want to say this also, that the man who sells butter through the winter will get for that butter a *constant demand* at a good price. He will have some trouble at first, but there is an unlimited demand for excellent butter in the large centres of population. Mr. Moyer stated they were paying twenty-three cents in Toronto for butter which is adapted to the wants of their customers, and that they get a butter which they could not sell at 5 cents or even give away. Meanwhile if we could send across a weekly shipment of butter to England, we would get the Danish prices, netting now about 26 cents per pound. In 1886, I went to the Colonial Exhibition. I had some butter from the Ontario Creamery. It did not get there in very good shape and was kept at the Exhibition until it was unsuitable to be sold as first-class butter and yet I think it sold at 108 or 110 shillings per cwt; but a capital shipment was sent through afterwards and that was sold at the price of Danish butter; and every year since, I have been asked by the firm who bought that shipment to send from three to five hundred tubs and I could charge what I had to pay to get it. There was no limit. Now one point more.

It is difficult to get farmers to go into this business, so I will tell you what my own view is, of the best way to go to work about it. You will find first of all that the farmers will hardly make their cows milk through the winter and send milk to the Creamery at first, unless they have positive proof that creameries which run in winter are to be a success in our country. Farmers are rather timid about going into anything they do not understand. If a man comes along with a first class humbug, many of them will go into that straight; but if a good thing comes along, they are the most conservative class of our population. The farmers say, "Well, we do not know exactly how well the Canadian made butter would sell in England; it might only sell as second class." Farmers fear that winter dairying by supporting the creameries would not pay very well. They say, "We don't know that England will pay us a high price for our fresh-made winter butter." To meet the difficulty and to dispel the doubt and hesitation, I would like to see in Ontario at two points perhaps, and in each province throughout the Dominion, such an experimental dairy station established, as would endeavour to discover the best method of making cheese, and find out how to solve problems in that difficult process of cheese-making. Then I would propose to have these same buildings used for making butter all winter, by having the farmers in those sections send their milk to the factory to be made into butter and to be sent to England. This butter might be shipped every second week or oftener; and if, at first, it does not sell at high prices, I think the Government has resources enough and interest enough in the dairy business, to be able to stand all the loss on weekly shipments of fresh made butter for five or twenty weeks until we establish a reputation in England and let the people know that our butter is excellent. The whole benefit will not come at once, but when people see how these stations succeed, then I dare say, that twenty more factories will start up the next year. They will become and continue a source of influence to help the farmers throughout the country. Now I do not see why we should not do that this coming winter of '91-92. If to the men whom the farmers send to Ottawa

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to vote their moneys, to make their laws, to help to develop the resources of this Dominion, they would say "We want that, we are going to have that"—the Members of Parliament would say "Yes, you will have it." We have in this Creameries' Association, with all the power of farmers behind it, an organisation which can say that these Stations should be started this year. If you want them, if you are bound to have them and if you don't get them, then I suppose you will have to do as the good old woman did when she was in trouble. She said she always got some consolation, when everything else failed, by trusting in that promise: "Just grin and bear it for a while."

Let me say a few things as to how this winter dairying presently can be carried on with advantage on the farms; because in connection with that scheme of helping farmers to make butter in winter by furnishing cream to creameries, I would like to see the farmers helped in some practical way to make more and finer butter at their own places. Notwithstanding the importance of the creamery industry and the advantages that flow from its development, I think one-half of the butter will be made in home dairies for some time to come—in my life-time anyway. From isolation of settlement, from various causes, about one-half of all the butter product in Canada will be made in private dairies. Now I think that the farmers' wives are eager to learn when they get a chance, and I know the farmers' wives are able to make the very finest of butter when they get a fair chance, but the trouble has been that the men have had all the good things. *They* had to have the horses, and the reaping, and mowing machines, and the driving sheds, and everything else, *they* wanted, while their wives had to get along with one pantry for keeping the milk, the butter, the cold vegetables, the pies and everything else. Then the cream took in the mixed flavour. If the farmer would give the wife a small milk house, I will warrant that it would be kept far more tidy than his driving shed; and she would take such a pride in it that it would make a man look after his part of the business better. Go round and see the women struggling with an old fashion churn, working twice as long in churning the butter as there is any need for, and until it is not so nice as it would be if churned more rapidly—all because *the man* had to buy a new top buggy and to build a new driving shed, &c., never thinking that his wife should have her strength spared and the needs of her department provided for. Get rid of these old fashioned churns and milk houses, and you will revolutionise the butter trade at once. I am not in favour of strikes; but if I could reach the ears of the good women that are such an ornament and joy to the households of Canada, I would have them strike and say,—"We won't do anything until you give us new churns and milk houses." Men would likely stand out for awhile, but they would have to give in.

I would like to see a scheme inaugurated throughout all the Provinces and across our whole continent, whereby one man or two men in each province, with a capital equipment of dairy apparatus loaded on a travelling waggon, would go to every township and spend one day at one side of it and another day in the middle and another day at the further end of it,—letting the people know before hand that they were coming—in order to shew the nicest butter prints and other dairy appliances, and practically to illustrate and demonstrate the best way of making butter. How much would that cost, do you suppose? Each man would cost, say $800 and for two $1,600. In this province, there are about two hundred thousand farmers somewhat interested in dairying. How much would that cost each? Less than one cent a piece. I think this would induce the farmer to get his wife a new milk house and a new churn. I believe if one woman gets a nice, attractive, cheap dress, twenty more women want to get the same or something better; and if one woman gets a nice new milk house and churn, twenty more women give their husbands no peace, night nor day, until they get that new milk house and churn also. This would bring very much good to the dairy business.

Let me mention a very few facts about the making of butter after it has got that far. The cow elaborates the milk in the udder. There is blood coming in by the arteries at the top of the under, which is composed of two glands lying lengthwise. Peculiar cells line the inside of the lactiferous ducts down which the milk

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trickles to the milk cisterns at the top of the teats. In each cell a formation grows that is almost like a tiny bud. That bud by and by drops off and trickles down with the liquid milk. These buds are the globules of fat from which butter is made. They float in the milk. Milk is practically all soluble except these globules, and these are held in suspension in the liquid of the milk. They come to the top—when the cream rises—because they are lighter than the serum; but if a person after milking, leaves the milk in the stable until the temperature goes down to sixty degrees, these globules do not get through quite so quickly. Changes occur which make it almost impossible for these fat globules to gather to the top, either so completely or so quickly as if the milk were set in cold water immediately. To give an illustration. A man gets into the habit of doing nothing for an hour after breakfast every day. He will by and by, want to take an hour and a half and by and by will become an unskilful, lazy man all day. Let him get into the habit of setting down the milk pail for half an hour after milking and these globules will follow his example, since the man they are trying to serve is not trying to hurry. In that way you will find that inanimate nature always responds to man's activity or to man's slowness.

The centrifugal machine is meant for the purpose of separating the cream. It swirls around very fast, and the heaviest parts of the milk are thrown to the outside and the lightest parts to the inside. Meanwhile if a man cannot use that—and for sometime it will not be in common use—every man through the winter time can get plenty of cold water, as ice is very easy of access. Cold water can be gotten very easily;, and if you put the milk pail into cold water, you will get off the cream very quickly.

What about this bad stable flavour that never comes in milk from a cow that is fed on wholesome feed? If you feed a cow in the winter time on turnips, you will have a turnipy flavor. Every man should have a well ventilated stable, but not too well ventilated;—not so well ventilated that in January those winter zephyrs will find their way across the cow's back,—but a fairly well ventilated stable that keeps the cow healthy. When the cow gives the milk, it is warm—between ninety-seven and ninety-eight degrees. At that temperature milk will evaporate slowly, and stable odour can not settle on it so long as it is steaming; but if you leave it until cold, it will absorb the stable odour. If you attend to this matter of quick setting you get two gains,—more cream and butter and a better quality of both. A man never does the right thing without getting two or three consecutive rewards for it. Unmeasured are the advantages of doing what is right at the right time.

Then a very few words about the effect of churning. In making butter at home, one can all through the winter churn once a week only if need be, and have the butter of exquisite flavour. Thus, you see, there is a great deal of labour saved by churning one day a week instead of three. That can be done in this way; if the cream is quickly cooled until it stands at forty degrees and is left cold until one day before churning, and then warmed up gradually to seventy degrees, and has added to it a small portion of sour cream or sour skim milk, the cream will churn easily and save all the trouble of churning and washing of utensils three times a week. Keep the cream at a temperature of 40°, raise it to 70° one day before churning, and add about two per cent. of sour cream or sour skim milk. No one can afford to churn without a thermometer. He might as well shut his eyes and try to guess the colour of the neck-tie of the next man. This plan of trying to tell the temperature with the fingers is no use.

If you will do these things you will find that dairying in our country will begin to take the place it should have in our agriculture. It will be the one thing to which all the rest of the farm work will mainly tend, and the selling of concentrated products will pay far better than the marketing of hay and coarse grains. A man can concentrate more skill and labour in a ton of butter, which at twenty-five cents a pound is worth $500, than he can load into an equal weight of hay. Besides he need not load into $500 worth of butter one-tenth as much of real hard manual labor as into the hay required to fetch as much money. It will leave and compel more time to

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think; and thought always sells dear in products. So instead of going on—blindly grinding out blind results—merely following the men that have gone before us, we will find Canada certainly the best place to make milk, cheese and butter—summer for cheese mainly, winter for butter mainly. The raising of stock in winter and the fattening of swine in summer can be combined. With these, sheep and horses can be reared. The more of these products and animals and the less hay, grain and straw we sell, the richer we will keep our farms and the farmers will become wealthier than before. Along that line I believe winter dairying will come; and when it does come, we will wonder why we have been foolish so long.

## XII.—MIND AND MUSCLE ON THE FARM.

The following is part of an address which I delivered at the Annual Convention of the Dairymen's Association of Eastern Ontario, at Brockville, Ont., on 7th and 8th January, 1891.

The farmers of Canada require to do more thinking, instead of more labouring with their hands. The experimental stations of this country are intended to aid in the enlargement of thought and to stimulate activity in head work among the farmers. Somebody's clear thinking must precede and underlie every rational action that makes for the mitigation of toil and the increase of profit. Farmers spend too little time in practical thought. Men in other callings sit down to think out the questions pertaining to their business, but the farmer is often too tired to think on purpose to plan. Every farmer should think out the problems he has to face, and having solved them mentally, he should proceed to carry his plans into practice. Too many farmers are content to get their living in a dreary, humdrum way, without a single aspiration more than to have a bare living—and two ounces of tobacco a week. If each would try to be the leading farmer of the locality, profits would come more certainly and easier, than if there be only the desire to be merely a sort of higher animal that eats and sleeps comfortably. I was pleased to hear the Minister of Agriculture for Ontario, say that governments cannot legislate good times for the farmers. Governments cannot legislate bad times for the agriculturists. If a man depends upon himself he can make good times come, but if he looks off to the far hills and lets his muscles and brain become numb he will never amount to anything. Personal ambition is a good thing in a farmer, and so is persistence. Now, farmers often cannot make ends meet, because they lack the element we call persistence. Let me give an illustration. In one part of the Dominion recently visited, I found that the roofs of houses were still wearing those brackets used twenty years ago when the shingles were put on. There were new barns grown old, before the doors had been hung. Most things were left half finished; and the people wondered why the good Lord did not smile upon them. They were complaining of hard times and moving away, yet that section is in my opinion blessed with good land and a fine climate. But the people lacked persistence, reliance, aspiration and clear thinking.

A farmers occupation demands peculiar powers and special training. Men who live in cities or towns have only one trade or business or profession, but the man who lives on the farm has to follow a three-fold occupation. He must be a good tradesman and understand the use of tools; he must be a good business man, to know when to buy and sell, and he must be a professional man to plan how and when and what to sow and feed in order to get a profit from his work. He must be fitted for his calling, if success is to follow. Farming with every body but Scotch people is to make money;—the sole object with the Scotch people is to set a good example.

I will not speak to you about the importance of knowing how to handle tools, etc., any more than to suggest its importance. You all know that in neighbourhoods

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where ploughing matches are held annually, the crops grow the better. And the boy who excels in ploughing, usually becomes fond of the farm work. Where land is ploughed uniformly the crop has a better chance in the seed bed, and so it pays to encourage good ploughing.

It is not necessary to dwell upon the business aspect of a farmer's life. It is too generally the case that the farmer does all the business of the family, even after the boys are grown up. The young men have no experience in marketing until they are thrust out, at say twenty-five years of age, to do for themselves—with the experience of a lad of ten. Let the boy take a load of grain to market, and even if he loses a little at first, it will not be a great amount; and he will be gaining valuable experience which will be a most useful part of his education.

The farmer should thoroughly *understand* his business. The man who knows *why* be drives a spade into the ground will do better work because of that knowledge. If he does not know why he should drain his land, he will not be able to adjust his efforts to his conditions with the same certainty of success.

Speak to some farmers about their place in society, and they will hardly ever assert themselves as having influence, power or dominion. But if a man can govern plant and animal life for good, he will likely be able to influence his fellows in the higher activities of life. Many a man is lost because he would not think for himself but delegated that to others. When a man begins to think, and says "I want to know," he is asserting his manhood, and that one thing distinguishes the man from the hind. A man in those countries where agriculture is behind is called a hind,—a grade between a man and a lower animal. But as the tiller of the soil, thinks, he assumes or rather resumes the birthright of prosperous manhood. In this country we have a capital illustration of this. First we had the deep and almost impenetrable forest; and then a farmer was a devastator. Those magnificent monarchs of the woods fell before the strokes of his axe, and the bush became a ruin. While the work was destructive, there was not much thought or skill required. But when man began to put new plants in the place of those cut down, he began to need the helpful guidance of clear thinking. Then came the construction of roads, the erection of bridges, and the building of houses, and general development. For that kind of constructive work, —that work which emulates creation,—a man must have some thought and bring his own hands to his own work.

The farmers were, at first, getting big crops from virgin fields; but after a time the fields became poor, the crops would not yield enough, and men needed new instruction in order to make the earth give forth a fresh increase. Farmers need to rescue their calling from a condition of decay. No sudden calamity or disease is going to strike us; but agriculture has been suffering from slow decay. Farmers must recover themselves, and that improvement must come through the mind.

Many farmers have had a prejudice against education, but I am happy to know that it is no longer needed, that one should plead with them as to the value of an education; for they now say that their boys must not start where they began. The old misconception was that education would hinder a man from being practically useful; but now these old prejudices are being uprooted, and it is recognised that *education helps to fit a man to bring things to pass*, whether it be in the office or on the farm. A man should live on a farm to guide nature to give out a bountiful increase just because he is there. A few farmers still belittle education because "it makes a man stuck up." They say "Oh, he is a fiddling scientist, but there is nothing in him." When you find a man who loads up knowledge,—to put it upon his back or in his head,—that he may carry it around with him for display, you will find him a very tiresome person indeed. But if you find a man who gets knowledge only to use it, and keep it under his feet for the elevation of his manhood, he is deserving of and will receive respect. I want to say to the youngest men here, that knowledge is power to a man, just as fuel is power to an engine. You may have a big engine,

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magnificently prepared by the skill of the ablest mechanics, but if there be no fuel in the furnace box, it will have no power. The boy who goes through life and gets no instruction about his own calling, is just as magnificently constructed, but he has no power, because he has not possessed himself of the energy of knowledge. Get knowledge, not to carry it about, but to make men better, more useful and more comfortable because of your having it. That is the purport and nature of true education.

Now just a few words about the present needs and how they can be met. The Government of Ontario has authorised the introduction into the public schools of a text book on "The First Principles of Agriculture." That I consider one of the greatest strides in the right direction ever made by the Government. It is a book costing only 40 cents, but it is a compendium of agricultural information, the equal of which has not before been printed. The boys of this province and Dominion will be all the better for reading this book; they will farm better because of its help. I hope every Board of School Trustees will insist upon having it put into their school, for the good of the little boys, the bigger boys and the old boys. I do not know of a better way of spending 40 cents than by buying this book,—and I have no royalty on it.

Then there is the agricultural press, but with our 200,000 farmers there is a circulation of only 20,000, or about one in every ten homes,—a bad state of things. Man's mind needs food, but that brain food should no more be borrowed than his breakfast should be. Such a breakfast would not taste very good. Do not borrow your agricultural paper; subscribe for it; pay for it.

We have also our Farmers' Institutes, the existence of which has done more than anything else in the past ten years to stimulate better farming.

Then we have our Dairy and Creamery Conventions, and last of all our Experimental Stations, to send the kindly light of information into the homes of the poor, as well as into the homes of the wealthy and enterprising. At Guelph, the Ontario Government has had an Experimental Station for sixteen years, and it has rendered good service to the province.

The Dominion Experimental Stations are to-day doing equally good work for all the provinces. In connection with this system there are a number of pupils who do not live at its centres, whom we may call non-resident pupils. They are expected to do all they can to assist in the usefulness of the work of the department. They are the farmers of Canada, and it is inspiration to a man to think that 3,000,000 non-resident pupils are looking to him to play the part of one giving them information—helpful knowledge.

The farmers are said to be seven-tenths of the people; and if you can get them to have confidence in and co-operate with each other in their study and work, you will have them bound together in a nationality which will make them strong and great. Individually—alone,—each farmer cannot do much. I have watched a boy blowing soap bubbles and floating them off into the air—little things they were,—glistening, sparkling timidly, and tenderly beautiful before they burst. There was so little water in their film that when one broke I could not see it. I began to wonder what a soap bubble would look like if it were as large as a waggon wheel. Perhaps I could then see some of those wonderful molecules. But Tyndall says that if a bubble were magnified to the size of the earth, those molecules might be seen about the size of No. 6 shot. Taken singly and alone, these infinitesimally wee units of matter cannot do much. Let us see an evidence of their power in united action. A quart of water,—all made up of these inconceivably little molecules,—is put into a strong iron vessel which it quite fills. The sides of the receptacle are as thick, and strong as the acquired experience of centuries of metal working can make them. The small opening is securely closed. The water is made to freeze.

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These little molecules seem to turn a little and, when shoulder to shoulder they all push together for more room for themselves, the strong vessel is burst like an egg shell.

Let farmers co-operate for ends that are just, and objects that are for the common good, and nothing can hinder their success. Education in concerted action is their great need,—not for coercive application but for mutual help in bettering their avocation, their circumstances and themselves.* * * We have in this country every natural resource that the heart of a man can desire; and to realise upon their power of service for our national development, we have only to put our skill into practice. I trust that all the educational helps to agriculture mentioned this evening may have plentiful fruitage, and such a gathering as this will not be in vain. May we all with one united effort, try to make this Canada of ours prosperous, that our land may be filled with happy homes, kindly hearts, and a strong manhood.

## XIII.—THE ESTABLISHMENT OF CHEESE FACTORIES AND CREAMERIES.

The business of dairying, when followed with intelligence and good judgment, ensures to the farmers a fair return for their labours. The co-operative plan of carrying on the manufacture of cheese in factories has superseded almost entirely the home or private dairy practice. Economy in the application of labour, and uniformity in the quality of the output, were the main factors which gave the factory system a good start. Since 1863, when the first co-operative factory in Canada was opened, the art of cheese-making has been studied and expounded until increased information and acquired skill have enabled our cheese-makers to win a foremost reputation abroad for general excellence of quality. Neither the reputation nor the character of the cheese on which it is founded, are yet beyond the possibility of improvement. One of the obstacles in the way of progress in the cheese industry of Canada, arises from the wretchedly poor and wholly unsuitable buildings in which it is attempted to carry on the business in many instances. To aid in the replacement of these unsightly, unwholesome, badly-constructed, worse-arranged and still worse conditioned buildings, by neat, convenient, compact structures in which cleanliness can prevail and in which the temperature can be controlled by the exercise of reasonable care, is one object of this bulletin. The illustrations, descriptions, general information and suggestions are also intended to guide those who are desirous of establishing cheese factories in districts where none, as yet, have been introduced.

The butter trade of Canada is not in a satisfactory state. Home dairying or butter making at private dairies has not yet been transferred to creameries where the manufacture of butter for a whole neighbourhood can be managed by one skilful butter-maker. The change of butter-making from private dairies, to public creameries will be much slower and never so general as in the case of cheese. The private dairies may meet the needs of home markets adequately, as soon as suitable milk-room and dairy utensils are provided in them; but it does not occur to me that the butter trade of the country will ever attain any considerable commercial importance, in providing an article which will be called for at high prices in foreign markets, until the creamery system has been adopted. Many enquiries come to this office from time to time seeking information as to the style and size of buildings that are needed, and the utensils which are required. To meet that expressed need, these illustrations, descriptions, general information and suggestions have been prepared for creameries as well as cheese factories.

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## THE BUSINESS BASIS.

The basis, upon which a cheese factory or creamery may be established and the business carried on, may be ;—

I.— *A private enterprise* whereby some individual or firm undertakes to provide buildings and to conduct the business.

II.—*The formation of a Joint Stock Company or Co-operative Association.*

### I.—PRIVATE ENTERPRISE.

In this case, one of four plans may be followed :—

(1.) The individual or business firm, who, for the purpose of this Bulletin, will be called the "manufacturer," may charge such a rate per pound of cheese or butter, as may be agreed upon with the *patrons* who furnish the milk or cream ; in consideration of which the *manufacturer* will undertake and agree to manufacture cheese or butter, as the case may be, of first-class merchantable quality, and to provide all furnishings required in the manufacture and boxing or packing of the same.

NOTE.—The collecting of the milk or the cream is sometimes done at the expense of the *manufacturer* and sometimes these are delivered at the factory by the *patrons*. A different rate is charged by the *manufacturer* in the two cases.

Where the milk is collected by the *manufacturer* for cheese-making, the usual charge ranges from two cents to two and three-quarter cents per pound of cheese, according to the quantity of the output, the distances to be travelled collecting the milk, and other local and particular circumstances.

Where cream or milk is collected by the *manufacturer* for butter-making, the charge varies from three and a half cents to five cents per pound of butter.

(2.) The *manufacturer* may carry on the business and meet all expenses incident thereto, in the providing of furnishings, &c., for a stated per cent. of the product.

NOTE.—The disposal of the by-products, whey, butter-milk, or skim-milk are matters for mutual agreement between the *manufacturer* and *patrons*. That will be more fully discussed in a later paragraph.

(3.) The *manufacturer* may purchase the milk or the cream from the *patrons* at such a price as may be agreed upon. The price may be uniform per 100 pounds of milk or per unit of cream for the whole season, or it may vary for different months.

NOTE.—This plan is not recommended as a prudent one, as the market for cheese or butter may advance to such high prices that the *patrons* will become dissatisfied with their bargain and lose interest in the factory, or the market may go so low that the *manufacturer* will be unable to realize from the product as much as he has agreed to pay. In either case the factory business suffers. A fair equitable basis, with as little as possible of the element of speculation, is safe.

(4.) A price for milk or unit of cream may be fixed on a sliding scale, according to some recognised market quotation for milk, cheese or butter from time to time during the season.

NOTE.—A unit of cream is sometimes called a "creamery inch" and should represent any quantity which will yield one pound of butter.

### II.—CO-OPERATIVE COMPANIES AND ASSOCIATIONS.

A co-operative company or association may be formed to conduct business as a *manufacturer*, in a similar capacity and on similar lines to those mentioned under the heading of "private enterprise"; or it may conduct business in a special way for the benefit of its share-holders who furnish milk or cream to the factory which it controls. In the latter case one or other of the subjoined sets of arrangements may be followed.

(5.) A certain charge per pound of product may be charged by the company, or association, called hereafter the *manufacturer*, similar to the plan mentioned in (1). The balance between the receipts and the expenditures of the Company or Association in its manufacturing capacity may be distributed as a dividend among

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the shareholders according to the amounts of stock which they hold, or it may be disposed of otherwise as they may direct.

(6.) Each shareholder may be entitled to furnish to the factory a stated quantity of milk or cream for every share which he holds in the Company or Association. The product from such quantities of milk or cream may be manufactured at a fixed rate per pound, sufficient to cover the actual running expenses of the concern; and a slight additional charge—(say ¼ cent per pound for cheese, or ½ cent per pound for butter)—may be made for all the quantities of milk or cream furnished in excess.

A rate equal to or higher than the shareholder's excess-rate may be charged for manufacturing the product for the milk or cream supplied by all non-shareholders.

NOTE.—According to this arrangement $12 of shares in cheese factory stock, might entitle the holder to furnish 9,000 pounds of milk annually at the lowest rate for manufacturing; $10 in a cream gathering creamery, and $15 in a centrifugal separator creamery, might entitle the holder to furnish cream or milk sufficient to yield 350 pounds of butter at the lowest rate for manufacturing.

(7.) Under the arrangements set forth in (1), (2), (5) and (6), a general meeting of the *patrons* called for that purpose should designate some individual as *Salesman* for the disposal of the products of the factory. The plan of appointing one salesman has been found more satisfactory than the appointment of two or three with equal powers. The *Salesman* may have an advisory committee associated with him.

### THE FORMATION OF JOINT STOCK COMPANIES AND CO-OPERATIVE ASSOCIATIONS.

These may be organized under the Dominion or Provincial Statues and obtain a charter of incorporation. In every case the capital stock should be placed at a sum large enough to enable the Company or Association to erect and equip suitable buildings; and power should be obtained to carry on the manufacture of cheese and butter or either.

A short name for the Company or Association, which will be distinctive rather than descriptive, is desirable.

In the Province of Ontario the following short Act was passed:—

### CHAPTER 24.

An Act to provide for the incorporation of Cheese and Butter Manufacturing Associations.

[*Assented to 23rd March, 1888.*]

HER MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

1.—1. At any time hereafter, any *five or more persons* who desire to associate themselves together for the purpose of manufacturing cheese or butter, may make, *sign* and acknowledge before a *notary public*, commissioner, or *justice* of the *peace*, in duplicate, and file in the office of the *registrar* of the registry division in which the business is to be carried on, a *certificate in writing*, in the form mentioned in the schedule to this Act, or to the same effect, together with the rules and regulations, signed by such persons respectively.

2. The signatures to the rules shall be verified by the affidavit of a subscribing witness thereto, made before a notary public, justice of the peace, or commissioner authorized to take affidavits, or before the registrar or deputy-registrar.

3. Upon the filing of the certificate and rules as aforesaid, the members of the association shall become a body corporate, by the name therein described, with the power to hold such lands as are required for the convenient management of their business.

4. The registrar or deputy-registrar shall, if desired by the persen filing the certificate, endorse on the other duplicate certificate and upon the duplicate of the rules, certificates of the other duplicates having been filed in his office, with the date of filing, and every such certificate shall be *prima facie* evidence of the facts stated therein and of the incorporation of the association.

5. All rules made by the association may be repealed, altered or amended by other rules passed at a regular meeting called for that purpose, provided no such new rule shall have any force or effect until a copy, proved by the affidavit of the president or other head officer of the association to be a true copy of the rule or rules passed by the association at a meeting specially called for the purpose of considering the same, has been filed in the registry office in which the certificate of incorporation was filed.

6. The association shall cause a book to be kept by the secretary, or by some other officer especially charged with that duty, wherein shall be kept.



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(*a.*) A duplicate of the certificate and of the rules filed as aforesaid in the office of the registrar, so that persons becoming members of the association may sign the said certificate and rules.

(*b.*) Any person so desiring to become a member of, or a stockholder in the said association after incorporation as aforesaid, may sign the said certificate and rules in the said book and shall thereupon become such member, and he shall be entitled to the rights and privileges thereof, and shall become liable as such member, as fully as though he had signed the certificate prior to the said incorporation of the association.

2. No association shall be registered under a name identical with that by which any other existing association has been registered, or so nearly resembling such name as to be likely to deceive the public.

3. Any certificate so to be filed, may designate any one or more places where the business is to be carried on; but if in different registry divisions, a duplicate must be filed in the registry office of each division.

4. A member of an association incorporated under this Act, may have shares therein to an amount mentioned in the by-laws of the association not to exceed $1,000.

5. Before an association commences operations under this Act, they shall agree upon and frame a set of rules for the regulation, government and management of the association, which shall contain—(1) a mode of convening general and special meetings; (2) provisions for audit of accounts; (3) power and mode of withdrawal of members; (4) appointment of managers and other officers, and their respective duties, and a provision for filling vacancies caused by death, resignation and other causes.

6. The rules of every association registered under this Act, shall bind the association and members thereof to the same extent as if each member had subscribed his name and affixed his seal thereto: and all moneys payable by any member to the association, in pursuance of said rules, shall be deemed to be a debt due from such member of the association.

7. The capital of the association shall be in shares of such denomination as mentioned in the rules.

8. The shares of the association shall be transferable subject to the consent and approval of the association.

9. All elections shall be by ballot, and each member shall have one vote for each share held by him, in respect of which he is not in default for any calls made thereon.

10. Every dispute between members or between members and the association established under this Act, or any person claiming through or under a member or under the rules of the association, and the directors, treasurer, or other officers thereof, shall be decided by arbitration in manner directed by the rules of the association, and the decision so made shall be binding and conclusive on all parties without appeal.

11. The liability of the shareholders shall be limited, that is to say, no share- holder in such association shall be in any manner liable for or charged with the payment of any debt or demand due by the association beyond the amount of his share or shares subscribed for, and any shareholder having fully paid up the amount of his said share or shares shall be absolved from all further liability.

12. The fees to be charged by the registrar for filing any certificate shall be fifty cents, and for any search relating thereto ten cents.

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## SCHEDULE.

(*Section 1 (1).*)

### Form of Certificate.

Province of Ontario, } We (*insert names of subscribers not less than five*) do hereby certify that we
TO WIT: } desire to form a company or association pursuant to the provisions of the "Act to provide for the incorporation of Cheese and Butter Manufacturing Associations."

The corporate name of the Association is to be (*insert name of the Association*), and the objects for which the Association is to be formed are (*insert objects for which the Association is formed*). The number of shares is to be unlimited and the capital is to consist of shares of (*insert amount of shares*) each, or of such other amount as shall, from time to time, be determined by the rules of the Association. The number of the trustees who shall manage the affairs of the Association shall be (*insert the number of trustees*), and the names of such trustees are (*insert names of trustees*), and the name of the place (*or* places) where the operations of the said Association are to be carried on is (*or* are) (*insert name of place or places where the operations of the said Association are to be carried on.*)

Dated the day of

(Signatures.)

On the day of A.D. 18 , before me personally appeared (*insert names of subscribers to the certificate*) to me known to be the individuals described in the foregoing certificate and they severally before me signed the said certificate and acknowledged that they signed the same for the purpose therein mentioned.

*A. B.*,
Justice of the Peace, *or*
Commissioner for taking Affidavits, *or*
Notary Public.

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## ORGANISATION.

The following forms of By-laws, Rules and Regulations, or as many of them as apply, may be filled up and modified to suit the local or peculiar needs of any Joint Stock Company or Association for the manufacture of butter or cheese.

### BY-LAWS.

*Shareholders and Shares.*

I. The Company (or Association) shall consist of shareholders, holding one or more shares of $..... each, who have enrolled their names in a book kept by the Secretary of the Company (or Association) for that purpose.

II. The payment of shares shall be made in such a manner and at such times as the Directors of the Company (or Association) shall from time to time direct, but in each case the Directors shall give at least thirty days' notice in writing to each holder of a share or shares in the Company (or Association) of such a call upon the stock, and not more than twenty per cent. of the value of the subscribed stock shall be called in at any one time, and not more than thirty per cent. shall be called for within twelve months.

III. The Directors shall call in at least twenty per cent. of the subscribed capital stock of the Company (or Association) at or before the last distribution of the proceeds from the sale of products in each year, until all indebtedness of the Company (or Association), which is not provided for by mortgage, is paid and satisfied.

IV. In default of payment of all or any such calls upon stock, the Directors shall proceed to enforce the payment of the same by an action at law; or they may, in the exercise of their powers, sell any such shares and apply the proceeds of the same towards the payment of any unpaid call or calls due in respect of such stock or shares, and the surplus,—if any remains after the payment of such arrears and all expenses incurred by the Directors in such action,—shall be deposited in some Chartered Bank to the credit of the defaulting shareholder, and all liability of the Directors shall thereby cease.

V. No subscriber for stock shall be accepted as a shareholder or be entitled to hold stock in the Company (or Association) until the same has been duly allotted to him by the Board of Directors.

VI. Stockholders may sell or transfer their shares, but such sale or transfer must be with the consent and approval of the Directors of the Company (or Association.)

VII. The books of the Secretary for the transfer of stock shall be closed during fifteen days preceding each annual meeting of the shareholders. The Secretary shall register all transfers of stock in the books of the Company (or Association) when furnished with duly executed instruments of transfer, signed by both transferrer and transferee. A fee of 25 cents for each share transferred shall be paid into the general fund of the Company (or Association). No transfer shall be considered valid until it has been made on the books of the Company (or Association).

VIII. Each shareholder shall be entitled to one vote for every share which he or she may hold, and shareholders may vote by proxy duly appointed. No person shall be entitled to act as a proxy who is not himself or herself a shareholder in the Company (or Association).

IX. No shareholder shall be entitled to vote upon any share or shares on which any regular instalment or call has become due and remains unpaid. No shareholder shall be entitled to vote on any stock unless the same shall have been registered in his name in the stock book of the Company (or Association) at least 15 days prior to such general or annual meeting of the Company (or Association).

X. No person shall be entitled to subscribe for or to vote upon more than..... shares of the Company, either in his or her own right or by proxy.



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*Officers.*

XI. The Officers of the Company (or Association) shall consist of a President, Vice-President, Secretary and Treasurer and.....Directors. The Directors shall be elected at the Annual General Meeting of the Company (or Association) and shall hold office for one year, and until their successors are elected. Shareholders only shall be eligible as Directors in the Company (or Association).

XII. The President, Vice-President and the Directors shall constitute the Board of Directors. All the members shall retire every year and an election shall take place at the Annual General Meeting for the appointment of their successors, and all the members of the retiring Board of Directors, if otherwise qualified, shall be eligible for re-election.

XIII. The President and the Vice-President of the Company (or Association) shall be elected at the Annual General Meeting of the Company (or Association) or they shall be elected from the Directors at the first meeting of the Board of Directors which is held after the Annual General Meeting of the shareholders.

*Powers of Directors.*

XIV. The presence of four Directors shall constitute a quorum for the transaction of business at a meeting of the Directors. The President, or in his absence, any Director who may be chosen by a majority of those present at such meeting shall preside, and shall decide all questions of order, subject to an appeal to the Board.

XV. If the Annual Meeting of the shareholders and *patrons* has not appointed a *Salesman*, then the Board of Directors shall appoint from their own number, or from the shareholders or *patrons* of the factory, a person who shall be *Salesman* of the products of the factory.

XVI. The Directors shall also appoint a Secretary and Treasurer, which two offices may be filled by one and the same person if the Directors so decide.

XVII. The President shall have a vote as a Director at all meetings, and in addition to that vote, in the event of a tie shall have a casting vote as Chairman.

XVIII. The Board of Directors shall have full power to enter into agreements or contracts with any person or persons to carry on the business of the Company (or Association), and such person or persons shall have their salaries and remuneration determined by the Board of Directors to whom they shall in all cases be directly responsible.

XIX. The Directors shall also have full power to determine all salaries and remuneration to officers or employees of the Company (or Association), but the Directors shall not be entitled to receive more than ..... for each meeting which they attend, unless the same be authorized at the Annual General Meeting of the shareholders.

XX. The Directors may borrow money for the purposes of the Company (or Association) in any manner which may seem to them expedient, and their bond, promissory note, or other obligation shall bind the Company (or Association); and they are authorized to hypothecate, mortgage, or pledge the real and personal property of the Company (or Association), in order to secure any sum or sums borrowed for the purposes of the Company (or Association).

XXI. The corporate seal of the Company (or Association) and the signature of the President,—or other officer designated for that purpose at a regular meeting of the Board of Directors,—counter-signed by the Secretary and Treasurer, shall be attached to all such instruments or documents pledging the credit of the Company (or Association).

XXII. The Board of Directors may appoint from their own number an Executive Committee which shall include, or to which may be added the *Salesman* and Secretary of the Company (or Association,) to whom they may designate executive powers to be exercised under the direction of the Board; and they may also appoint Standing Committees.

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XXIII. The Directors shall also appoint one Auditor to act in conjunction, in the auditing of the accounts of the Company (or Association), with an Auditor to be elected at the Annual General Meeting of the shareholders.

XXIV. In the case of any vacancy or vacancies occurring in the Board of Directors between the Annual General Meetings of the Company (or Association), they may be filled from qualified shareholders by the Board of Directors.

*Duties of the Secretary.*

XXV. (1.) The *Secretary* shall keep an accurate and true record of the minutes of the Annual Meetings, of any Special Meetings of the shareholders, and of the meetings of the Board of Directors.

(2.) He shall also keep an accurate account of all financial transactions of the Company (or Association).

(3.) He shall keep a stock book for the proper recording of the ownership and transfers of shares in the Company (or Association).

(4.) He shall render an accurate statement to each of the *patrons* of the Company (or Association) of his or her account therewith from time to time as the President may direct.

(5.) He shall prepare an annual statement for each of the *patrons* of the factory, and also an annual statement giving an abstract of the business of the Company (or Association) for presentation to the Annual Meeting, and he shall render an annual account of the affairs of the Company (or Associaiion) to the office of the Dairy Commissioner for the Dominion, at Ottawa.

*Duties of the Treasurer.*

XXVI. (1.) The *Treasurer* shall deposit all moneys received, by him, in..... .....Bank in his name as Treasurer.

(2.) He shall pay the same always and only on the order of the President, duly countersigned by the Secretary.

(3.) He shall present vouchers for all his expenditures to the Auditors, and shall present a statement of the receipts and expenditures of the Company (or Association) to the Annual General Meeting of the shareholders.

*Duties of the Salesman.*

XXVII. (1.) The *Salesman* shall use his best endeavours to sell the products of the factory so as to further the interests of the *patrons* to the best of his judgment and ability.

(2.) As soon as practicable after the completion of any sale, he shall notify the President and Secretary of the quantities sold, the price agreed upon, particulars of sale, date of shipment, and any other condition or element in the transaction which affects the *patrons* or the *manufacturer*.

*Annual Meeting.*

XXVIII. The Annual General Meeting of the shareholders shall be held at..... ..... .....or at such other place in..... as the Directors may determine, on the .....in.....each year.

XXIX. Notice of the time and place for the holding of such Annual General Meeting shall be given at least ten days previously thereto, in two of the newspapers circulating in the neighbourhood, and also by postal notice to that effect, mailed to each shareholder's address as last registered in the office of the Company (or Association.)

XXX. If from any cause the Annual General Meeting of the Company (or Association) shall not be held, or due and legal notice thereof shall not be given, then it shall be the duty of the Directors to cause a Special General Meeting of the shareholders to be called as soon as may be thereafter, for the purpose of transacting the business of the Annual General Meeting, and at such meeting or meet-

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ings all matters may be dealt with and acted upon as if such meeting were in fact the Annual General Meeting of the shareholders of the Company (or Association.)

XXXI. The rules of order for the Annual General Meeting shall be:—

1. The meeting called to order by the President or acting President.
2. The reading and disposal of the minutes of the last meeting.
3. The reading and disposal of communications.
4. Reports of Standing Committees appointed by a General Meeting of the shareholders.
5. Reports of Special Committees appointed by a General Meeting of the shareholders.
6. Reports of the Officers,—including the report of the *Salesman.*
7. Report of the Auditors.
8. Unfinished business.
9. Nomination and election of Officers for the ensuing year.
10. Appointment of one Auditor.
11. New business.

*Special Meetings.*

XXXII. Special Meetings of the shareholders may be called by the President or any four of the Directors, or on the requisition, in writing, of the shareholders of the Company (or Association) who may hold one-fourth of the subscribed stock of the Company (or Association); and in every such call or requisition for a Special Meeting, a statement shall be made of the definite purposes for which such Special Meeting is called, and no other business shall be transacted at such Special Meeting than shall be mentioned in the notice or notices which have been given calling the same.

XXXIII. At least ten days' notice of every Special Meeting shall be given by advertising the same in at least two newspapers circulating in the neighbourhood, and also by mailing a notice to the same effect to the address of each shareholder, as last registered in the office of the Company (or Association.)

XXXIV. Any alterations in the By-laws of the Company (or Association) shall be made only by a two-thirds vote at the Annual General Meeting of the shareholders.

XXXV. A copy of the By-Laws shall be at all reasonable hours, open for inspection by shareholders at the factory where the business of the Company (or Association) is carried on.

## CHEESE FACTORIES.

NOTE.—The By-Laws from I to XXXV on pages 9 to 14 are suitable for cheese factories or creameries; to them should be added for cheese factories the following:—

### RULES AND REGULATIONS.

1. The Company (or Association) hereinafter called the *manuacturer* shall draw the milk, manufacture and care for the cheese during the curing, provide boxes and all necessary furnishings, at a charge of ..... for every pound of cheese which is manufactured.

*or*

1*a*. The *manufacturer* shall charge each shareholder at the rate of ..... per pound of cheese for the manufacturing of the milk furnished by him up to ..... pounds per share of ..... in the stock of the Company (or Association) held by him or her, and shall charge all non-shareholders a rate of ..... per pound of cheese, in consideration of which the *manufacturer* will manufacture the cheese, care for it during curing, provide boxes and all necessary furnishings.

2. *Patrons* who may be dissatisfied with the weights of their milk recorded at the factory, must report the same to the Directors, that they may adjust and settle the matter.

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3. The milk of each *patron* shall be tested at any time during the season ; and, at the discretion of the Directors, a statement of the quality of the milk of all the *patrons* shall be posted up in the factory in a conspicuous place where it may be seen by all the *patrons* and shareholders.

4. In case any milk furnished should be of such doubtful quality as to warrant the assumption that it has been adulterated, a committee appointed by the Directors shall visit the premises of the *patron*, see his cows milked morning and evening, and have the quality of such milk compared with the record of the tests made of the milk which he was previously furnishing, and if a substantial difference in quality is evident, it shall be optional with the Directors as to whether they shall (1) prosecute the *patron* according to law, (2) effect a settlement with him upon the payment to the funds of the *manufacturer*, of such a sum as may be agreed upon, or (3) exclude the *patron* from the privileges of the factory for a stated number of years.

5. Each *patron* upon being notified, shall convey in a waggon or otherwise, his or her share of the cheese which has been manufactured, from the factory to the point of delivery as agreed upon by the *Salesman*, and failure to comply with this rule will subject the *patron* to a fine of $2.00, which shall be deducted from his share of the receipts from the sales of cheese. It is open to any *patron* to find a substitute for himself for the drawing of cheese.

6. If any *patron* should send to the factory upon the milk waggons engaged by the *manufacturer*, milk which is sour or unfit for use in cheese-making, such milk shall be returned to his or her milk-stand and a charge sufficient to pay the *manufacturer* for the expense of drawing it to the factory, and to the milk-drawer for returning it to the milk-stand shall be made in every such case. The decision of the Directors in this matter shall be final.

7. Each *patron* shall be entitled to the cheese required for use at his own table at the wholesale price ; but no cuts shall be made in less than pieces of 5 pounds.

8. In the case of any *patron* who does not continue to furnish the milk from his or her herd to the factory until the close of the manufacturing season, a sum equal to ..... cents per pound of all the cheese manufactured from the milk which they have furnished during the season, will be deducted from his or her share of the receipts, unless he or she shall first have obtained the consent of the Directors to such discontinuance.

9. The *manufacturer* shall insure the cheese in one or more Insurance Companies to any extent; but the *manufacturer* will not be responsible for any cheese which may be destroyed, other than for the amount received by the said *manufacturer* from the Insurance Companies.

10. Milk shall be supplied from only healthy cows, which are fed upon wholesome food, with access to plenty of pure water and salt.

11. The pastures, yards and lanes shall be kept free from carrion and all decaying matter which may cause noxious smells.

12. Each *patron* shall furnish pure sweet milk, to which nothing has been added and from which no part has been removed or kept back; and if any be reserved, it shall be of the average quality of milk given by the herd of cows.

13. Milk must be drawn from the cow in a cleanly manner ; the udders should be brushed or washed, and milking with dry hands is preferable to the practice of dipping the fingers in the pail in order to moisten them.

14. Immediately after the milk is drawn from the cow, it should be strained through a wire or cloth strainer.

15. All other pails and utensils with which the milk is brought into contact must be of tin; the use of wooden pails for milking or holding milk is strictly forbidden; and any contravention of this rule will subject the *patron* to the liability of being deprived of the privileges of the factory.

16. The milk shall be aërated by dipping, pouring or stirring, or by the use of an aërator; during hot weather after it has been aired, it should be cooled quickly to

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at least the temperature of the atmosphere; the milk-can should never be left in a tub of water over night, unless the milk has been previously cooled to below 60 degrees.

17. The milk must be kept in a place where the atmosphere is free from foul and injurious smells.

18. Milk that is left without the protection of some roof, shall be protected from the falling of rain, either by turning the lid of the milk can upside down over it, or any other efficacious means; and if on any occasion when rain has fallen, the cheese-maker discovers by the use of the testing instruments that a per cent. of added water is present, he shall deduct from the weight of the milk a number of pounds equal to the quantity of added water that is revealed by the use of the lactometer.

19. The night's and morning's messes of milk shall be kept in separate vessels until the arrival of the milk waggon.

20. The milk-cans shall be kept clean and sweet; and when a cheesemaker shall discover the can of any *patron* in a state unfit for the carrying of milk without detriment to its quality, he shall notify the *patron* of that fact and report the same to the Directors. After the first offence the *patron* may be subjected to a fine of 50 cents for every time that the can shall be sent to the factory in an unclean condition.

21. The Directors or any of the *patrons* may inspect the cans on any of the waggons or milk-stands at any time and report the same to the cheese-maker or other officers of the *manufacturer*.

22. Each and every milk-can shall be washed with cold or tepid water and scalded with boiling water once a day; they should afterwards be aired.

23. All milk to be conveyed to the factory on the public milk waggons shall be delivered on the side of the public highway, (unless otherwise arranged by the directors), upon a milk-stand of convenient height, and which will afford shade from the sun and protection against rain.

24. The surroundings of the milk-stand shall be kept clean and free from bad smells; and the feeding of swine within 100 feet of the milk-stand is strictly forbidden.

25. The milk shall be delivered on the milk-stand at a time to suit the convenience of the milk drawer, who shall not leave any milk-stand before 5:30 a.m. and who shall reach the factory with his load not later than 9 a.m.

26. The whey shall be disposed of, as the *patrons* determine at the Annual Meeting.

27. The cheese-maker shall reject any milk which he considers to be unfit for use in the manufacture of the finest quality of cheese; and his judgment in the matter shall be final.

28. Each *patron* who furnishes milk to the factory is thereby considered as having agreed to the foregoing rules and regulations.

## CONSTRUCTION.

### LOCATION AND SITE.

For the erection of a cheese factory and the establishment of co-operative dairying, a *location* should be selected which is central and convenient to a section of country adapted for and inclined towards dairying.

The *site* should be,

(1.) Suited for easy and effective drainage,

(2.) Supplied with abundance of pure cold water,

(3.) Easy of access by good roads.

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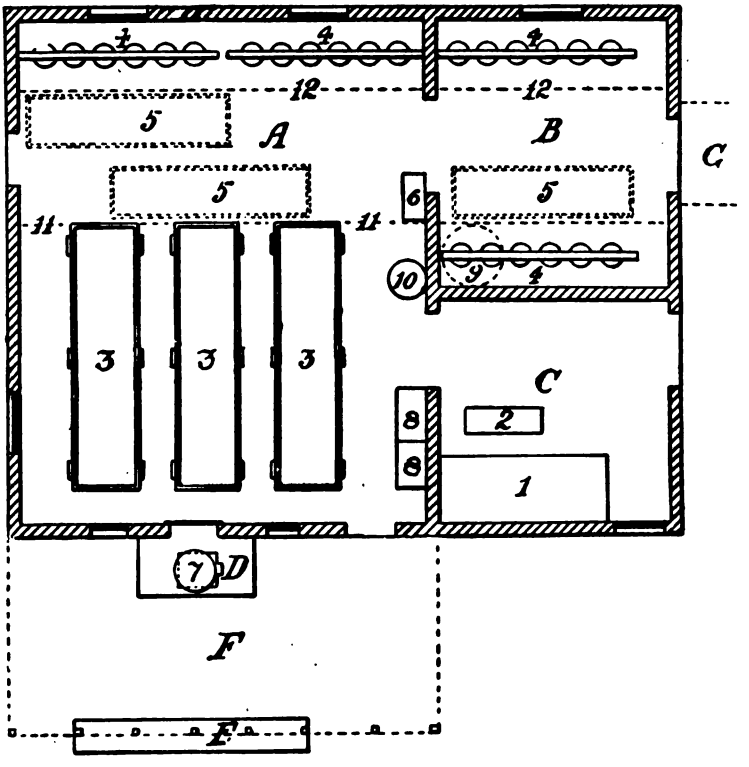
## PLANS.

The following sketches and plans will illustrate the size and nature of the structure required for businesses of different sizes:—

FIG. I.




Figures I and II shew the plan for a cheese factory of 500 to 700 cow capacity.

A.—Cheese Making Room, 30 ft. x 24 ft.;
B.—Cheese Press-Room, 16 ft. x 14 ft.;
C.—Boiler and Engine Room, 13 ft. x 14 ft.;
D.—Milk-Weighing Platform, 3 ft. 6 in. x 7 ft.;
E.—Shelf for empty cans;
F.—Covered Roadway for Milk-Waggons;
G.—Covered Passage to Cheese Curing-Room.

1. Steam Boiler; 2. Engine; 3. Milk Vats; 4. Cheese Presses; 5. Curd Sinks; 6. Curd Cutter; 7. Weighing Can and Scales; 8. Milk Tester and Table; 9. Water Tank, placed overhead; 10. Water Barrel; 11. Gutter, 3 in. x 4 in., with fall from 6 to other side of Making-Room; 12. The floor in A and B, between 11, 11, and 12, 12, is rounded, with a fall from the centre of 1 inch towards 11, 11, and 1 inch towards 12, 12; there is also a fall of 1 inch in the floor from the back of 4, 4, 4, to 12, 12, but there is no gutter at 12, 12, or at 11 between 6 and G.

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FIG. II.

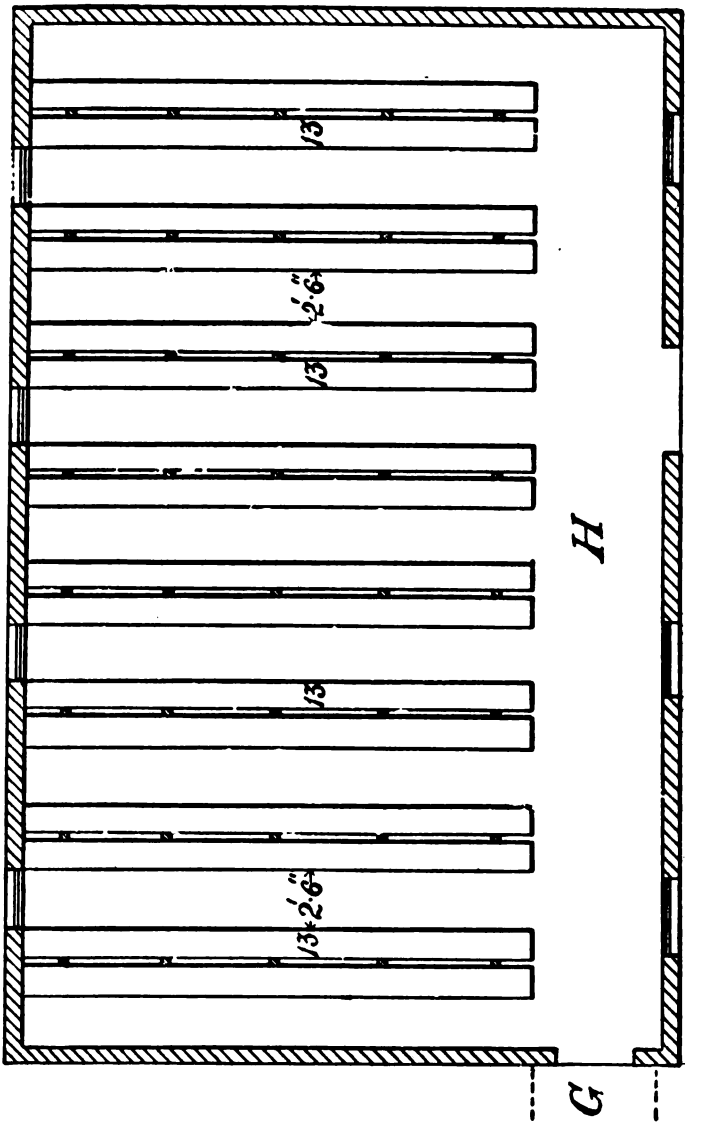


Fig. II shews the plan for a Cheese Curing-Room 48 ft. x 30 ft.

G.—Covered passage from Press-Room;
H.—Passage at the ends of Cheese Shelves;
13.—Cheese Shelves of which a detail is shewn in Fig. V.

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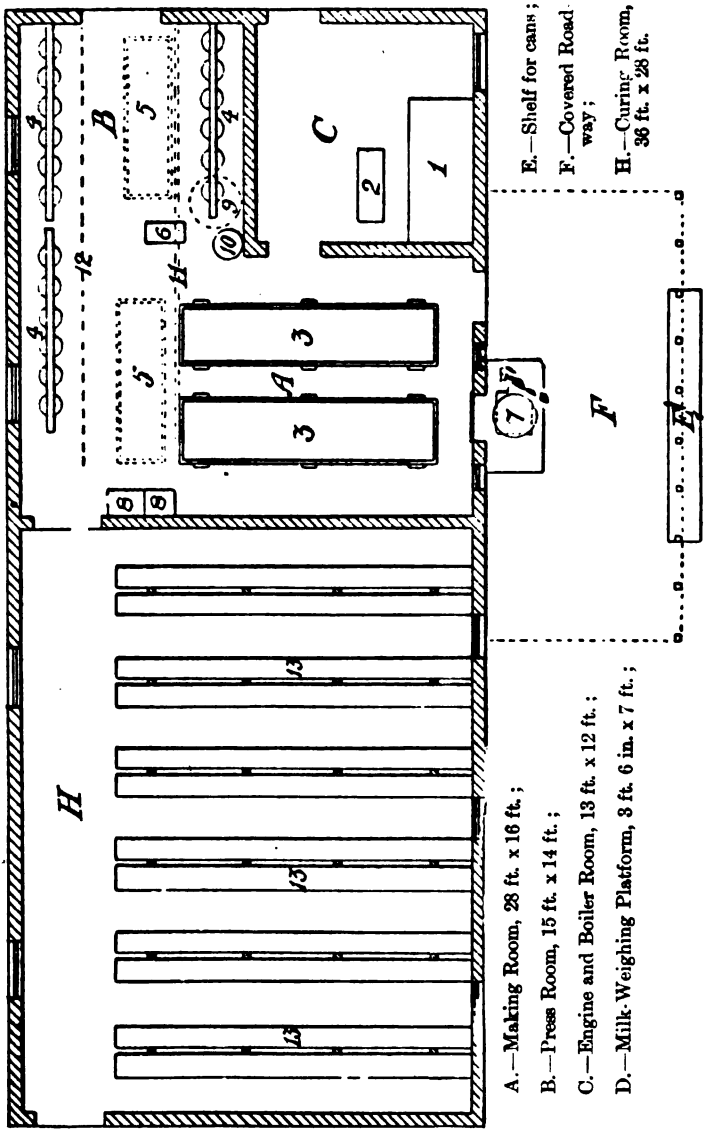
FIG. III.

**This Fig. shews the plan for a Cheese Factory of 300 to 500 cow capacity.**


A.—Making Room, 28 ft. x 16 ft.;
B.—Press Room, 15 ft. x 14 ft.;
C.—Engine and Boiler Room, 13 ft. x 12 ft.;
D.—Milk-Weighing Platform, 3 ft. 6 in. x 7 ft.;
E.—Shelf for cans;
F.—Covered Roadway;
H.—Curing Room, 36 ft. x 28 ft.

1. Steam Boiler; 2. Engine; 3. Milk Vats; 4. Cheese Presses; 5. Curd Sinks; 6. Curd Cutter; 7. Weighing Can and Scales; 8. Milk-Tester and Table; 9. Water Tank, placed overhead; 10. Water Barrel; 11. Gutter, 3" x 4", with a fall from 3, 3, towards 6; 12. Line towards which floor inclines from both sides; 13. Cheese Shelves.

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FIG. IV.

This Fig. shews the plan for a Cheese Factory of 150 to 300 cow capacity.

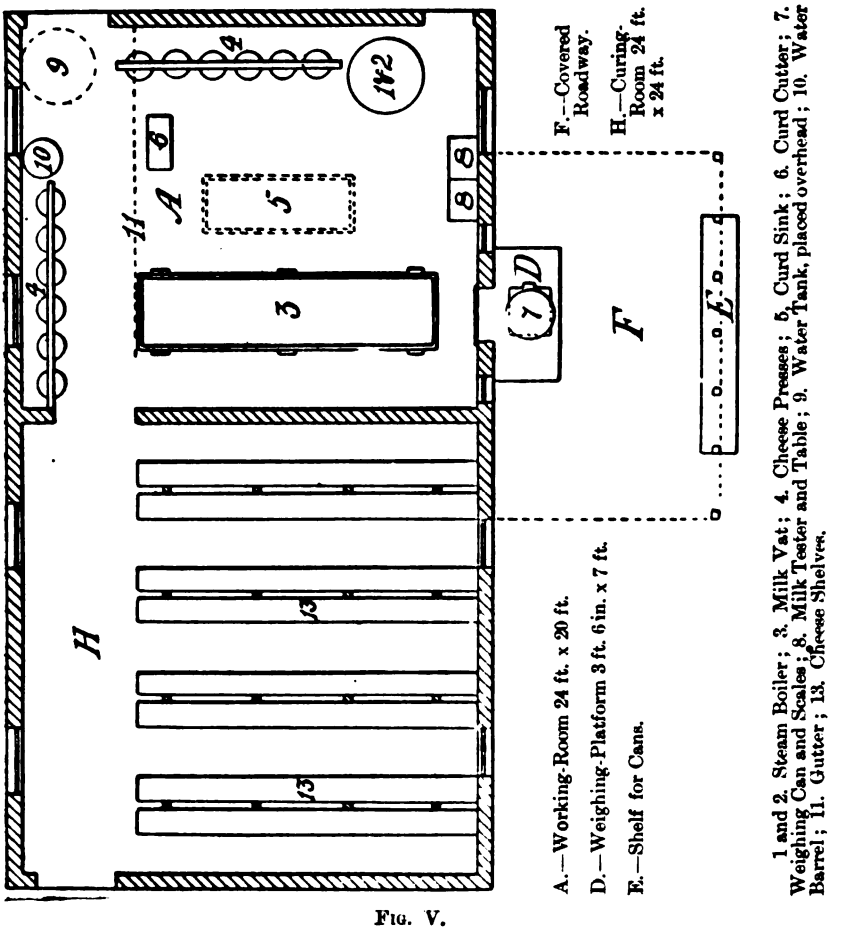
H
A
D
F
F.—Covered Roadway.
H.—Curing-Room 24 ft. x 24 ft.
A.—Working-Room 24 ft. x 20 ft.
D.—Weighing-Platform 3 ft. 6 in. x 7 ft.
E.—Shelf for Cans.
1 and 2. Steam Boiler; 3. Milk Vat; 4. Cheese Presses; 5. Curd Sink; 6. Curd Cutter; 7. Weighing Can and Scales; 8. Milk Tester and Table; 9. Water Tank, placed overhead; 10. Water Barrel; 11. Gutter; 13. Cheese Shelves.

FIG. V.

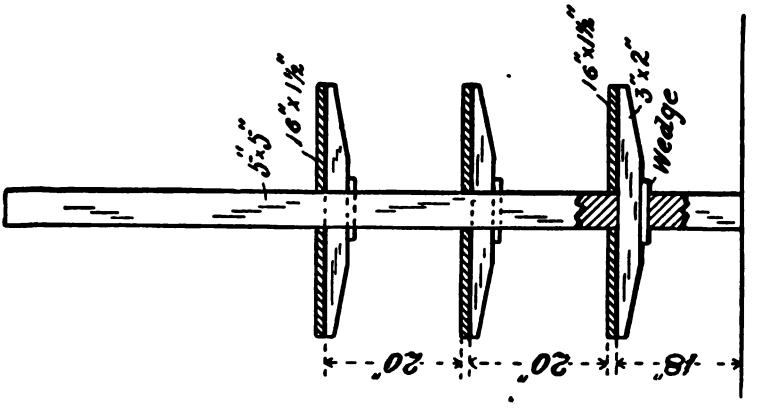


Fig. V shews the Post, the Arms, for three tiers of shelves, and the ends of the Cheese Shelves, which may be of any kind of wood that will not warp.

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FIG. VI.

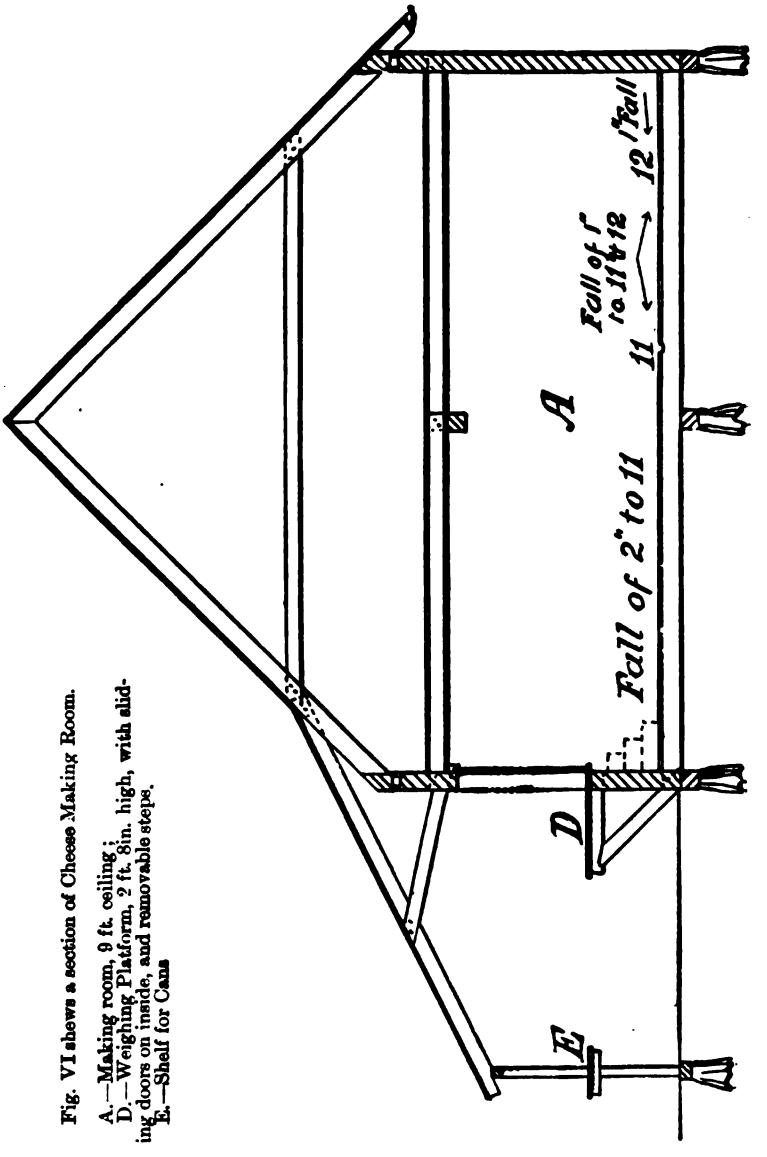


Fig. VI shews a section of Cheese Making Room.

A.—Making room, 9 ft. ceiling;
D.—Weighing Platform, 2 ft. 8in. high, with sliding doors on inside, and removable steps.
E.—Shelf for Cans

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BUILDINGS.

The buildings may be constructed by the use of a frame of square timbers mortised together, or by the erection of a balloon frame of 2 in. by 6 in. studs placed on sills 8 in. by 8 in.

*Walls.* The walls should be finished by:—

(1.) Placing 2 in. by 6 in. scantling 16 inches apart;
(2.) Nailing on the outside of these studs 1 in. lumber horizontally;
(3.) Covering the lumber with building paper;
(4.) Finishing the outside, on the paper, with boards and battens, or with V siding;
(5.) Nailing on the inside of the studs, 1 inch lumber horizontally;
(6.) Covering the lumber with building paper;
(7.) Finishing the inside, on the paper, with dressed lumber.

The Curing-Room walls should be finished in a manner similar to those of the Making-Room; and the ceilings of both should be finished with dressed lumber on building paper. Storage room for cheese boxes should be provided in the loft over the Curing-Room. The building will be better by being painted inside and outside.

*Floors.* The floor of the Making-Room and Press-Room should be of 1½ inch red pine, tongued and grooved, nailed on the joists. It should receive two coats of oil, applied hot; the last coat may be coloured, so as to stain it dark. The floor of the Curing-Room should be of 1 inch lumber nailed on the joists, with tarred building paper on it; and on top of these, 1¼ inch tongued and grooved flooring.

*Doors.* The door at G, in Fig. I and the corresponding doors in Figs. III and IV should be 4 feet 6 inches wide, to admit the Milk Vats, etc. The doors between the Boiler-Room C, and the Making-Room A, and between the Press-Room B, and the Making-Room A, in Figs. I and III should be sliding doors.

*Windows.* All the windows should be provided with sashes, suited for opening at the top and bottom; and those in the Curing-Room should have close shutters, by means of which the Room can be kept dark when so desired.

*Ventilation.* One ventilating box from the ceiling of the Making-Room and two from the ceiling of the Curing-Room should run through the roof. Into the Curing-Room, an air drain at least 100 feet long, may admit cool fresh air through the floor.

In case a dwelling for the cheese-maker is required, it may be provided, by making the studs of the side walls, high enough to permit of the loft-story, over the Curing-Room or Curing-Room and Making-Room, being fitted up for that purpose.

## EQUIPMENT.

Apparatus and utensils for a cheese factory of 500 to 700 cow capacity:—
1 Steam Boiler of 8 horse power.
1 Engine of 6 horse power.
1 Water Injector.
3 Milk Vats of 5,000 pounds capacity each.
24 Cheese Presses (upright or gang).
3 Curd Sinks.
1 Curd Cutter or Curd Mill.
1 Hoisting Crane.
1 Weighing Can of 500 pounds capacity.
1 Milk Conductor.
1 Curd Knife (perpendicular).
1 Curd Knife (horizontal).
Weighing Scales:—1 pair for Milk, 1 pair for Cheese, and 1 pair for Salt.
2 Thermometers, 2 Floating Thermometers.
Milk Testing Instruments.

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1 Babcock or other Milk-Tester.
1 Graduated Measuring-Glass 8 ounces; and 1, 16 ounces.
24 Press Rings.
3 Rakes for stirring Curd.
1 Flat-sided Curd Pail.
1 Bandager.
2 Floor Brushes and Rubber Scraper.
3 Tin Pails, large Dipper, and small Dipper and Strainer.
Steam Pipes, Water Pipes and Hose connections.
Stencils, Stencil Plates, and Brush for branding.
1 Cheese Trier.
1 Water Tank of 10 barrels capacity.
1 Water Barrel.
1 Whey Tank of 55 barrels capacity.
1 Inspirator or Pump for elevating whey.

For a cheese factory of 300 to 500 cow capacity a similar equipment is required; but the following changes may be made:—
1 Steam Boiler, 6 horse power.
No Engine.
2 Milk Vats of 5,000 pounds capacity each.
18 Cheese Presses.
2 Curd Sinks.
18 Press Rings.
2 Rakes for stirring curd.
1 Whey Tank of 40 barrels capacity.
All the other apparatus and utensils, the same as for the larger factory.

MANAGEMENT.

The By-laws have set forth the nature of the management and the duties and powers of most of the officers. These notes concerning the duties of the cheese-makers and milk-drawers may be added.

*Duties of Cheese-makers.*

1. It shall be the duty of the cheese-maker to use his best endeavours to manufacture an article of uniformly fine merchantable cheese.
2. He shall be responsible for and make good in money, any loss that may be sustained from the making of inferior cheese through carelessness, neglect or incapacity.
3. He shall keep a correct record of the weight of milk furnished by each *patron* and deliver the same to the Secretary of the Company (or Association).
4. He shall test the milk of each *patron* from time to time, to assure himself that it is pure, wholesome, honest, and of good average quality.
5. He shall inspect the milk-cans and report upon their condition to the Directors.
6. He shall inspect the milk waggons and report upon their condition as to cleanliness, &c., to the Directors.
7. He shall enter in a pass book for each *patron*, a record of the weight of milk received in his or her name.
8. He shall keep the factory and its utensils clean.
9. He shall care for the cheese until they are cured, or until one month after the close of the manufacturing season; and he shall use every reasonable precaution to maintain the temperature of the curing-room at the points, where it is most suitable for the curing process at different seasons of the year.
10. He shall see that the whey tank is thoroughly cleaned at least once a week.
11. He shall see that the surroundings of the premises are kept free from bad odours.

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12. He shall use his best endeavours to advance the interests of the *manufacturer* and the *patrons*.

13. In case any of the *patrons* or Directors shall find the weighing can, milk conductor, milk vats, curd sinks, curd cutter, cheese presses or any other utensil, or the floor of the factory, in a filthy state, whereby the quality of the milk or cheese is liable to be injured, the sum of $1.00 for every such offence and every such utensil shall be deducted from the monies coming to the cheesemaker from the *manufacturer*.

### *Milk Drawers.*

The agreement with the milk-drawers should stipulate:—

1. That they shall keep their milk waggons clean and free from all bad smells.
2. That they shall protect the milk cans against damage.
3. That they shall use straps or ropes to prevent spilling or waste.
4. That they shall be liable for all loss incurred through their negligence or fault.
5. That they shall be liable to a fine of $1.00 for every time when they fail to reach the factory at or before the stipulated time of 9 a.m., unless they furnish to the Directors a good and sufficient reason.
6. In a case where whey is returned to the *patrons*, they shall apportion to each *patron*, and deliver upon his milk-stand such quantities as may be decided upon by the cheese-maker.

NOTE.—A table is appended to this Bulletin setting forth the quantities of whey that may be returned in each can, for a given quantity of milk received.

### SUGGESTIONS.

Bulletins of instructions on the care of milk for cheese-factories, should be sent to each *patron*. Copies of these may be obtained free by application to the office of the Dairy Commissioner, Ottawa. A dodger setting forth a few points on the care of milk, may with advantage be prepared by the *manufacturer* or cheesemaker and sent to each *patron* in the milk-can once a month.

A Special Committee on the adulteration of milk should be appointed for each factory; and they should discharge their duties so as to entirely eliminate the dishonest practices of watering, skimming, or keeping back the strippings of the milk.

Milk pass-books should be sent to each *patron* once every week or once every fortnight, with a record of the quantities of milk which have been credited at the factory.

When the distribution of proceeds is made, a statement should be furnished to each *patron* setting forth the details of his or her account.

At the end of each season, an annual statement of the business of the year should be furnished to the *patrons*. It should set forth:—

(1.) The number of days during which the factory was in operation;
(2.) The number of *patrons* who furnished milk;
(3.) The total quantity of milk received;
(4.) The total quantity of cheese manufactured;
(5.) The average price for which the cheese of each month's make was sold;
(6.) The average quantity of milk required to make a pound of cheese during each month;
(7.) The total value of the cheese sold;
(8.) The total amount of money distributed to the *patrons*;
(9.) An abstract of the annual statement of the Treasurer of the Company (or Association).

Similar statements of the business of the Company (or Association), together with a summary of the Treasurer's report, should be furnished annually to the office of the Dairy Commissioner at Ottawa.

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## CREAMERIES ON THE CREAM-GATHERING PLAN.

NOTE.—The By-laws from I to XXXV, on pages 9 to 14, are suitable for cheese factories or creameries; to those should be added for creameries on the cream-gathering plan, the following:—

### RULES AND REGULATIONS.

1. The Company (or Association), hereinafter called the "*manufacturer*," shall collect the cream, manufacture and store the butter, provide packages and all necessary furnishings, at a charge of.....for every pound of butter which is manufactured;

1*a*. The "*manufacturer*" shall charge each shareholder for the manufacturing of the cream furnished by him or her, at the rate of.....per pound of butter, up to.....pounds of butter per share of $.....in the stock of the Company (or Association) held by him or her, and shall charge all non-shareholders a rate of.....per pound of butter; in consideration of which the *manufacturer* will manufacture the butter, store it, provide packages and all necessary furnishings.

2. *Patrons* who may be dissatisfied with the measurements of their cream, must report the same to the Directors, who shall adjust and settle the matter.

3. The cream of each *patron* shall be tested at least twice during each week of the season; and the cream shall be valued according to its quality as revealed by such test.

4. Each *patron*, upon being notified, shall convey in a waggon or otherwise, his or her share of the butter which has been manufactured, from the factory to the point of delivery as agreed upon by the *Salesman*; and failure to comply with this rule will subject the *patron* to a fine of $2.00, which shall be deducted from his or her share of the receipts from the sales of butter. It is open to any *patron* to find a substitute for the drawing of the butter.

5. Each *patron* shall be entitled to the butter required for use on his or her own table at the wholesale price, but no quantity shall be put up in less than.....pounds.

6. In the case of any *patron* who does not continue to furnish the cream from his or her herd to the creamery until the close of the manufacturing season, a sum equal to.....cents per pound of all the butter manufactured from the cream furnished during the season, shall be deducted from his or her share of the receipts, unless he or she shall have first obtained the consent of the Directors to such discontinuance.

7. The *manufacturer* shall insure the butter in one or more Insurance Companies to any extent; but the *manufacturer* will not be responsible for any of the butter which may be destroyed, other than for the amount received by the said *manufacturer* from the Insurance Companies.

8. The cream shall be furnished from the milk of only healthy cows which are fed upon wholesome feed with access to plenty of pure water and salt; they shall be prevented from eating any feed which will give an injurious flavour or taint to the butter.

9. The pastures, yards and lanes shall be kept free from carrion and all decaying matter which may cause noxious smells.

10. The cream furnished by each *patron* shall be clean, pure and sweet; and, in case any grounds should exist for suspecting that the bulk of the cream as furnished by any *patron* is not in every sense similar to the sample taken for use in the *test*, a Committee appointed by the Directors shall visit the premises of the *patron* and make examination for themselves regarding such matter, and if any unfair or dishonest practice shall be proven to have existed, it shall be optional with the Directors as to whether they shall (1) prosecute the *patron* according to law, (2) effect a settle ment with him or her upon the payment to the funds of the *manufacturer* of such a sum as may be agreed upon, or (3) exclude the *patron* from the privileges of the creamery for a stated number of years.



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11. Milk must be drawn from the cows in a cleanly manner; the udders should be brushed or washed, and milking with dry hands is preferable to the practice of dipping the fingers in the pail in order to moisten them.

12. Immediately after the milk is drawn from the cow, it should be strained through a wire or cloth strainer.

13. All pails and other utensils with which the milk is brought into contact must be of tin; the use of wooden pails for milking or holding milk is strictly forbidden; and any contravention of this rule will subject the *patron* to the liability of being deprived of the privileges of the creamery.

14. The milk must be kept in a place where the atmosphere is free from foul and injurious smells.

15. Vessels in which the milk is set shall be kept clean and sweet, and the tank into which the vessels are set shall be kept free from bad odours; and if a cream collector shall discover the setting vessels or water tank of any *patron* to be in a state unfit for the keeping of milk without detriment to its quality, he shall notify the butter-maker of that fact, who shall report the same to the *patron* and Directors. After the first offence, the *patron* may be subjected to a fine of 50 cents for every time that a setting vessel or tank shall be found in an unclean condition.

16. Buttermilk at the creamery shall be disposed of as the *patrons* determine at the Annual Meeting. The cream collector under the instructions of the butter-maker shall reject any cream which he considers to be unfit for use in the manufacturing of the finest quality of butter, and the butter-maker's judgment in the matter shall be final.

17. Each *patron* who furnishes cream to the creamery is thereby considered as having agreed to the foregoing rules and regulations.

## CONSTRUCTION.

### LOCATION AND SITE.

For the erection of a creamery and the establishment of co-operative dairying upon the cream-gathering plan, a *location* should be selected which is central and convenient to a section of country adapted for and inclined towards dairying.

The *site* should be:—

(1) Suited for easy and effective drainage,

(2) Supplied with an abundance of pure cold water,

(3) Easy of access by good roads.

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PLANS.

The following sketches and plans illustrate the size and arrangement of the structure required for the carrying on of the business :—

FIG. VII.

**This Fig. shews the plan for a Creamery under the cream-gathering plan of 700 to 1,000 cow capacity.**

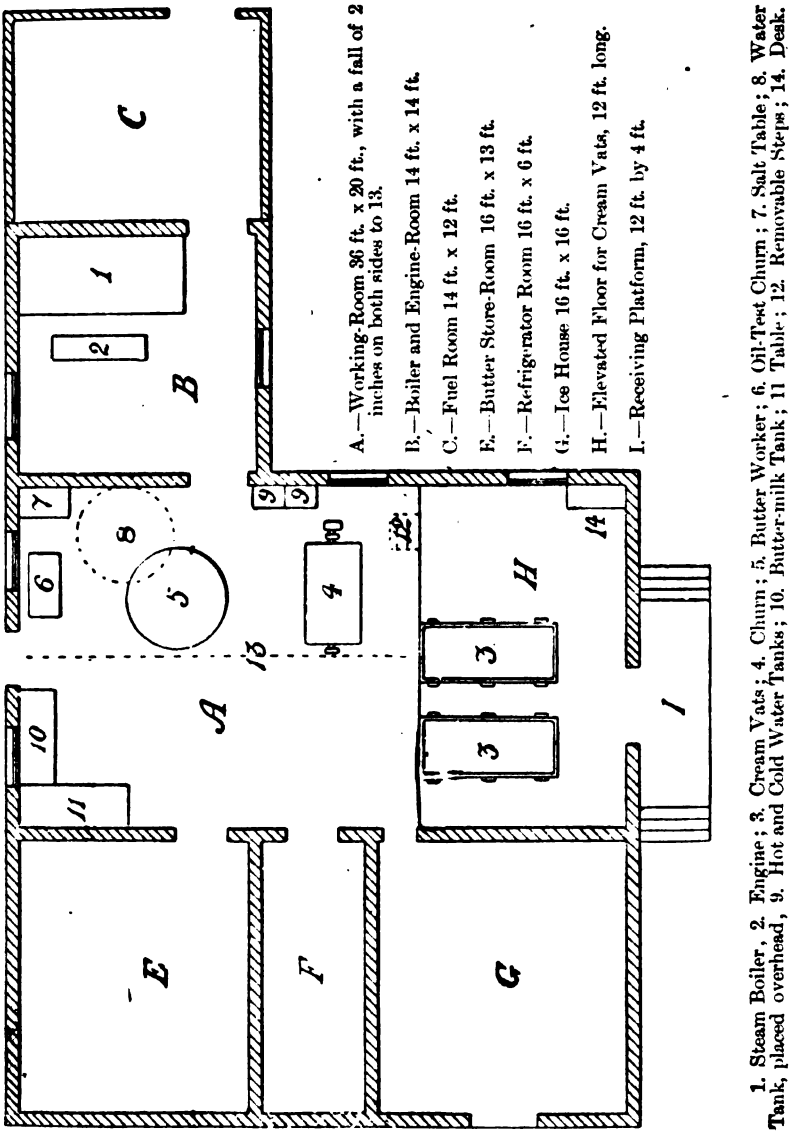
A.—Working-Room 36 ft. x 20 ft., with a fall of 2 inches on both sides to 13.
B.—Boiler and Engine-Room 14 ft. x 14 ft.
C.—Fuel Room 14 ft. x 12 ft.
E.—Butter Store-Room 16 ft. x 13 ft.
F.—Refrigerator Room 16 ft. x 6 ft.
G.—Ice House 16 ft. x 16 ft.
H.—Elevated Floor for Cream Vats, 12 ft. long.
I.—Receiving Platform, 12 ft. by 4 ft.
1. Steam Boiler, 2. Engine; 3. Cream Vats; 4. Churn; 5. Butter Worker; 6. Oil-Test Churn; 7. Salt Table; 8. Water Tank, placed overhead, 9. Hot and Cold Water Tanks; 10. Butter-milk Tank; 11 Table; 12. Removable Steps; 14. Desk.



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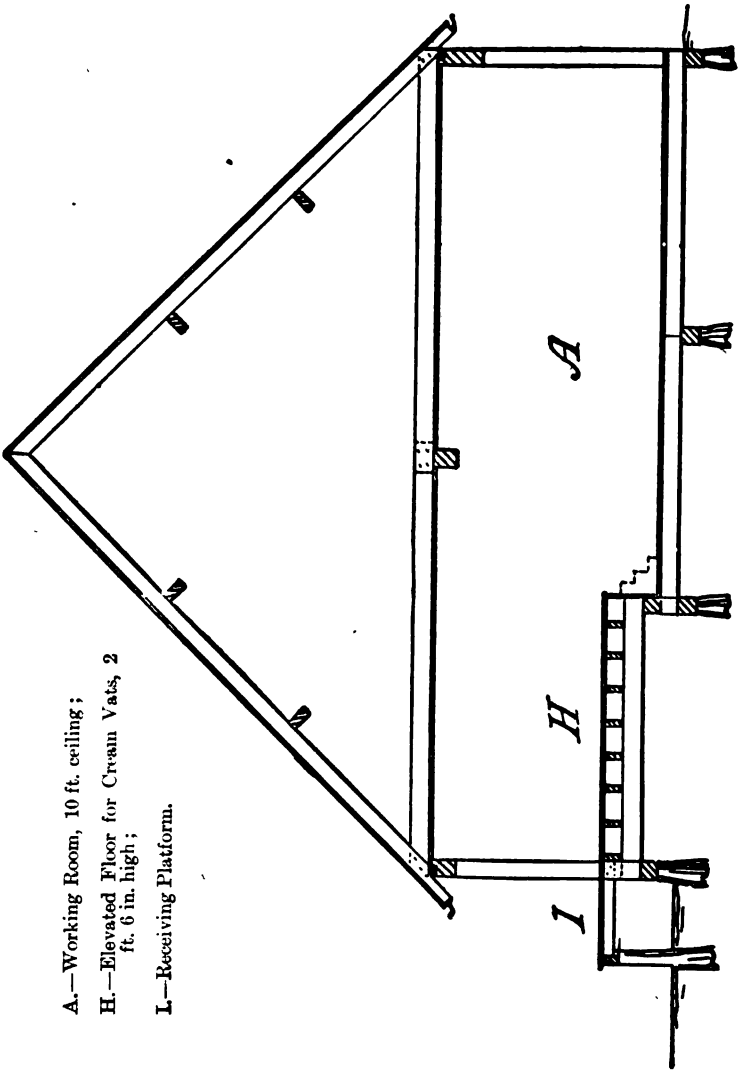
FIG. VIII.

Fig. VIII shews a section of Fig. VII.




BUILDINGS.

The buildings may be constructed by the use of a frame of square timbers mortised together, or by the erection of a balloon frame of 2 in. by 6 in. studs, placed on sills 8 in. by 8 in.

*Walls.*—The walls should be finished by:—

(1) By placing 2 in. by 6 in. scantling 16 inches apart;

(2) Nailing on the outside of these studs 1 in. lumber horizontally;

(3) Covering the lumber with building paper;

(4) Finishing the outside, on the paper, with boards and battens, or with V siding;

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(5) Nailing on the inside of the studs, 1 inch lumber horizontally;
(6) Covering the lumber with building paper;
(7) Finishing the inside, on the paper, with dressed lumber.

The walls of the Ice-house G, Refrigerator F, and Butter Store-room E should be constructed by the use of studs 2 in. by 4 in. placed 16 inches apart. On one side of these, building paper should be tacked; and then a 2 in. by 2 in. strip should be nailed up and down the face of each stud. The further construction of the walls, both inside and outside, may be the same as for the rest of the buildings, namely,—two ply of lumber with building paper between, on both sides of the studs. The Ice Box K, over E and F, as shewn in Fig. 10, should be constructed in a manner similar to the walls of G, E and F.

*Floors.*—The floor of the Refrigerator and Butter Store-room should be of one-inch lumber nailed to the joists with building paper on it, and on top of this 1½ inch red pine, tongued and grooved. The floor of the Working-Room A and H should be of 1½ inch red pine, tongued and grooved, nailed to the joists. It should receive two coats of oil, applied hot; the last coat may be coloured, so as to stain it dark.

A clay or earth floor in G, B and C will be quite sufficient.

Storage room for Butter Tubs, &c., should be provided in the loft over the Working-room. The building should be painted inside and outside.

*Doors.*—The door at I in Fig. VII, and the doors in the corners of the Working-room A, Fig. IX, should be 4 ft. 6 in. wide, to admit the Cream Vats or Milk Vats, &c. The doors between the Boiler-room B and the Working-room A, in Figs. VII and IX, should be sliding doors, as also should be the doors between A and H in Fig. IX.

*Windows.*—All the windows should be provided with sashes, suited for opening at the top and bottom.

*Ventilation.*— One ventilating box from the ceiling of the Working-room should run to the roof and also one through the elevated ceiling of the Ice-house G.

In case a dwelling for the butter-maker is required, it may be provided by using studs for the side walls high enough to permit of the loft-storey over the Working-room being fitted up for that purpose.

## EQUIPMENT.

Utensils for a creamery under the cream-gathering plan of 700 to 1,000 cow capacity:—

1 Steam Boiler of 8 horse power.
1 Steam Engine of 8 horse power.
Water Injector.
2 Cream Vats of 300 gallons capacity each.
1 Cream Conductor.
Strainers for Cream Vat, for Churn, and Hair Sieve for Buttermilk.
1 Churn of 200 gallons capacity.
1 Butter-Worker.
Weighing Scales:—1 pair Platform Scales for Butter, 1 pair of Counter Scales for Butter, 1 pair for Salt.
2 Butter Spades, 1 Butter Paddle, 2 Butter Ladles.
Oil-test Churn with cream-collectors' cases complete.
2 Thermometers, 2 Floating Thermometers.
Butter Printer.
Graduated Measuring Glass, 8 ounces.
Stencil Plates and Brush for branding.
Butter Trier.
3 Tin Pails.
1 Large Dipper, 1 Small Dipper, 1 Strainer Dipper,

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Shafting, Belting, Steam Pipes and Water Pipes connected with Hose.
Floor Brushes and Rubber Scraper.
1 Water Tank of 20 barrels capacity.
1 Cold Water and 1 Hot Water Tank.
1 Butter-milk Tank.

### REQUIREMENTS AT THE FARMS.

Besides these apparatus and utensils it will be necessary that every *patron* should have conveniences for the separation of the cream from the milk. Where a large herd is owned, the use of a small hand separator may be found economical. In other cases the deep-setting system will give the best returns, considering the cost of the utensils, the labour involved, and the quantity and quality of the cream obtained. The ordinary deep-setting pail is 20 inches deep and 8½ inches in diameter. It holds 35 pounds of milk conveniently. Any dairyman can reckon the number which he will require from that data, bearing in mind the fact that enough vessels should be available for holding both the morning's and evening's messes of milk. An extra pail or two should also be available for holding the cream. Two inches in depth of a can 8½ inches in diameter contain 113 cubic inches, which quantity has been called "a standard creamery inch."

Sometimes a foolish rivalry arises between the *patrons* who furnish cream to creameries, in the effort to furnish cream which will yield a large test of butter per "inch." The attention of the *patrons* should be directed to securing the *largest possible quantity of butter* from the milk which has been set, and that in conjunction with *furnishing cream in the best condition* for the making of fine butter. It is but seldom possible to obtain these, viz.:—the largest quantity of butter from the milk and cream in the best condition, if the cream which is sent to the creamery is exceedingly rich in butter-fat.

The milk should be set as quickly as possible after it is drawn from the cows. The pails or setting vessels should be placed in cold water, in order that their contents may be cooled quickly to 45 degrees or lower. After they are set they should be left undisturbed until the skimming is commenced. Ordinarily they should be left at perfect rest for over 20 hours. When the cream has been removed from the milk, it should be kept as cold as possible until the *collector* receives it or until it is delivered to the creamery.

### MANAGEMENT.

The By-laws, Rules and Regulations have set forth the nature of the management and the duties and powers of most of the officers. These additional notes concerning the duties of the butter-makers and cream collectors may be added:—

#### *Duties of Butter-Makers.*

1. It shall be the duty of the butter-maker to use his best endeavours to manufacture an article of uniformly fine merchantable butter.
2. He shall be responsible for and make good in money, any loss that may be sustained from the making of inferior butter through carelessness, neglect, or incapacity.
3. He shall keep a correct record of the quantity of cream furnished by each patron and of the quality of the same, as revealed by the oil-test churn or other testing apparatus, and deliver the same to the Secretary of the Company (or Association).
4. He shall test or cause to be tested, the cream furnished by each patron at least.....times every week during the season.
5. He shall inspect the cream-collecting waggons and the cream-collecting cans or tanks, and report upon their condition as to cleanliness, etc., to the Directors.
6. He shall keep the creamery and its utensils clean.
7. He shall care for the butter until the close of the manufacturing season; he shall see that all butter which is not in air-tight packages, is brined at least once

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every fortnight; and he shall use every reasonable precaution to maintain the temperature of the store-room at a point which is most suitable for its preservation.

8. He shall see that the surroundings of the premises are kept free from bad odours.

9. He shall use his best endeavours to advance the interests of the *manufacturer* and the *patrons*.

10. In case any of the *patrons* or Directors shall find any of the utensils or the floor of the creamery in a filthy state, whereby the quality of the butter is liable to be injured, a sum of $1.00 for every such offence and every such utensil, shall be deducted from the monies coming to the butter-maker from the *manufacturer*.

*Cream Collectors.*

The cream-collectors should be furnished with cream-collecting cans or a cream-gathering tank. Besides the inside tin of these, they should be finished with some non-conducting sides, in order to protect the cream against the influences of hot weather while in transit. Double sides with a hollow space of $\frac{3}{4}$ of an inch between, will suffice in the case of circular cans. Wooden sides with hollow spaces made by the use of paper should surround the tin lining of the gathering tanks. In both cases a float should rest on the top of the cream, to prevent agitation from effecting any churning.

Each cream-gatherer should also have a *measuring can* 12 inches in diameter. One inch in depth in a 12-inch can, contains practically the same quantity of cream as 2 inches in an $8\frac{1}{2}$ inch can; that is "a standard creamery inch."

He should also be furnished with a set of cream-testing tubes to be used in an Oil Test Churn. These tubes are numbered. After the cream has been properly measured in a pail 12 inches in diameter, its whole volume should be properly mixed by pouring from one vessel to another not less than three times. After-that treatment, a sample of the cream should be taken in one of the test tubes, and the number of the same recorded opposite to the number or name of the *patron*.

NOTE.—When these samples are truly representative of the cream which is furnished by any *patron*, the butter-maker can discover and calculate the quantity of butter which that particular cream will produce, in order that an equitable distribution of the proceeds may be effected.

The cream-collector should also enter into a pass book to be retained by each *patron*, the number of inches of cream with which he or she has been credited; and a monthly statement should be furnished to each *patron* showing the quantity of butter which the cream he has furnished has produced per "inch."

BY-PRODUCTS.

The disposal of the buttermilk can be arranged according to the preferences of the *patrons* and the *manufacturer*. For pig feeding it may be estimated as having a value equal to the production of 5 pounds of increase in live weight, per 100 pounds of butter-milk.

REPORTS.

Statements to each *patron* of the particulars of his account with the *manufacturer* should be furnished to every *patron*, when a distribution of the proceeds from a sale is made. An annual return should also be made to the office of the Dairy Commissioner at Ottawa. It should set forth:—

(1.) The number of days during which the creamery was in operation;

(2.) The number of *patrons* who furnished cream;

(3.) The total quantity of cream received—in inches or other units of measurement;

(4.) The number of these required to yield one pound of butter during each month;

(5.) The total quantity of butter made;

(6.) The average price for which the butter of each month's make was sold;

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(7.) The total value of the butter sold;
(8.) The total amount of money distributed to the *patrons*;
(9.) An abstract of the Annual Report of the Treasurer of the Company (or Association).

## CREAMERIES ON THE CENTRIFUGAL-SEPARATOR PLAN.

NOTE.—The by-laws from I to XXXV, on pages 9 to 14 are suitable for cheese factories or creameries; to them should be added for creameries on the centrifugal-separator plan the following :—

### RULES AND REGULATIONS.

1. The Company (or Association), hereinafter called the *manufacturer*, shall draw the milk, manufacture and store the butter, and provide packages and all necessary furnishings at a charge of.....for every pound of butter which is manufactured;

*or*

1*a*. The *manufacturer* shall charge each shareholder for the manufacturing of the milk furnished by him or her, at the rate of.....per pound of butter, up to..... pounds of butter per share of $.....in the stock of the Company (or Association) held by him or her, and shall charge all non-shareholders a rate of.....per pound of butter; in consideration of which the *manufacturer* will manufacture the butter, store it, provide packages and all necessary furnishings.

2. *Patrons* who may be dissatisfied with the weights of their milk recorded at the factory, must report the same to the Directors, that they may adjust and settle the matter.

3. The milk of each *patron* shall be tested at any time during the season; and at the discretion of the Directors, a statement of the quality of the milk of all the *patrons* shall be posted up in the creamery in a conspicuous place, where it may be seen by all the *patrons* and shareholders.

4. Unless milk is being tested and valued according to its percentage of butter-fat, the following shall be in force:—In case any milk furnished should be of such doubtful quality as to warrant the assumption that it has been adulterated, a committee appointed by the Directors shall visit the premises of the *patron*, see his or her cows milked morning and evening, and have the quality of such milk compared with the record of the tests made of the milk which he or she was previously furnishing; and, if a substantial difference in the quality is evident, it shall be optional with the Directors as to whether, they shall (1) prosecute the *patron* according to law, (2) effect a settlement with him or her upon the payment to the funds of the *manufacturer* of such a sum as may be agreed upon, or (3) exclude the *patron* from the privileges of the creamery for a stated number of years.

5. Each *patron* upon being notified, shall convey in a waggon or otherwise, his or her share of the butter which has been manufactured, from the creamery to the point of delivery as agreed upon by the *Salesman*; and failure to comply with this rule will subject the *patron* to a fine of $2.00, which shall be deducted from his or her share of the receipts from the sales of butter. It is open to any *patron* to find a substitute for the drawing of the butter.

6. If any *patron* should send to the creamery upon the milk waggons engaged by the *manufacturer*, milk which is sour or unfit for use in butter-making, such milk shall be returned to his or her milk-stand and a charge sufficient to pay the *manufacturer* for the expense of drawing it to the creamery, and to the milk-drawer for returning it to the milk-stand, shall be made in every such case. The decision of the Directors in this matter shall be final.

7. Each *patron* shall be entitled to the butter required for use on his or her own table at the wholesale price, but no quantity shall be put up in less than.....pounds.

8. In the case of any *patron* who does not continue to furnish the milk from his or her herd to the creamery until the close of the manufacturing season, a sum equal

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to.....cents per pound on all the butter manufactured from the milk which they have furnished during the season, will be deducted from his or her share of the receipts, unless he or she shall first have obtained the consent of the Directors to such discontinuance.

9. The *manufacturer* shall insure the butter in one or more Insurance Companies to any extent; but the *manufacturer* will not be responsible for any butter which may be destroyed, other than for the amount received by the said *manufacturer* from the Insurance Companies.

10. Milk shall be supplied from only healthy cows, which are fed upon wholesome food with access to plenty of pure water and salt.

11. The pastures, yards and lanes shall be kept free from carrion and all decaying matter which may cause noxious smells.

12. Each *patron* shall furnish pure sweet milk, to which nothing has been added and from which no part has been removed or kept back; and if any be reserved, it shall be of the average quality of milk given by the herd of cows.

13. Milk should be drawn from the cows in a cleanly manner; the udders should be brushed or washed; milking with dry hands is preferable to the practice of dipping the fingers in the pail in order to moisten them.

14. Immediately after the milk is drawn from the cow, it should be strained through a wire or cloth strainer.

15. All pails and other utensils with which the milk is brought into contact must be of tin; the use of wooden pails for milking or holding milk is strictly forbidden; and any contravention of this rule will subject the *patron* to the liability of being deprived of the privileges of the creamery.

16. The milk shall be aërated by dipping, pouring or stirring, or by the use of an aërator; during hot weather after it has been aired, it should be cooled quickly to at least the temperature of the atmosphere; the milk-can should never be left in a tub of water over night, unless the milk has been previously cooled to below 60 degrees.

17. The milk must be kept in a place where the atmosphere is free from foul and injurious smells.

18. Unless milk is being tested and valued according to its per cent. of butter-fat, the following shall be in force:—Milk that is left without the protection of some roof shall be protected from the falling of rain, either by turning the lid of the milk-can upside down over it, or any other efficacious means; and, if on any occasion when rain has fallen, the butter-maker discovers by the use of the testing instruments that a percentage of added water is present, he shall deduct from the weight of the milk, a number of pounds equal to the quantity of added water that is revealed by the use of the lactometer.

19. The night's and morning's messes of milk shall be kept in separate vessels until the arrival of the milk waggon.

20. The milk-cans shall be kept clean and sweet, and when a butter-maker shall discover the can of any *patron* in a state unfit for the carrying of milk without detriment to its quality, he shall notify the *patron* of that fact and report the same to the Directors. After the first offence the *patron* may be subjected to a fine of 50 cents for every time that the can shall be sent to the creamery in an unclean condition.

21. The Directors or any of the *patrons* may inspect the cans on any of the waggons or stands at any time, and report the same to the butter-maker, or other officers of the *manufacturer*.

22. Each and every milk-can shall be washed with cold or tepid water andscalded with boiling water once a day; they should afterwards be aired.

23. All milk to be conveyed to the creamery on the public milk-waggons shall be delivered on the side of the public highway (unless otherwise arranged by the Directors) upon a milk-stand of convenient height, and which will afford shade from the sun and protection against rain.

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24. The surroundings of the milk-stand shall be kept clean and free from bad smells; and the feeding of swine within 100 feet of the milk-stand is strictly forbidden.

25. The milk shall be delivered on the milk-stand at a time to suit the convenience of the milk drawer, who shall not leave any milk-stand before 5:30 a.m. and who shall reach the creamery with his load not later than 9 a. m.

26. The skim-milk and butter-milk shall be disposed of, as the *patrons* determine at the Annual Meeting.

27. The butter-maker shall reject any milk which he considers to be unfit for use in the manufacture of the finest quality of butter; and his judgment in the matter shall be final.

28. Each *patron* who furnishes milk to the creamery is thereby considered as having agreed to the foregoing rules and regulations.

## CONSTRUCTION.

### LOCATION AND SITE.

For the erection of a creamery and the establishment of co-operative dairying upon the centrifugal separator plan, a *location* should be selected which is central and convenient to a section of country adapted for and inclined towards dairying.

The *site* should be,—

(1.) Suited for easy and effective drainage,

(2) Supplied with an abundance of pure cold water,

(3) Easy of access by good roads.

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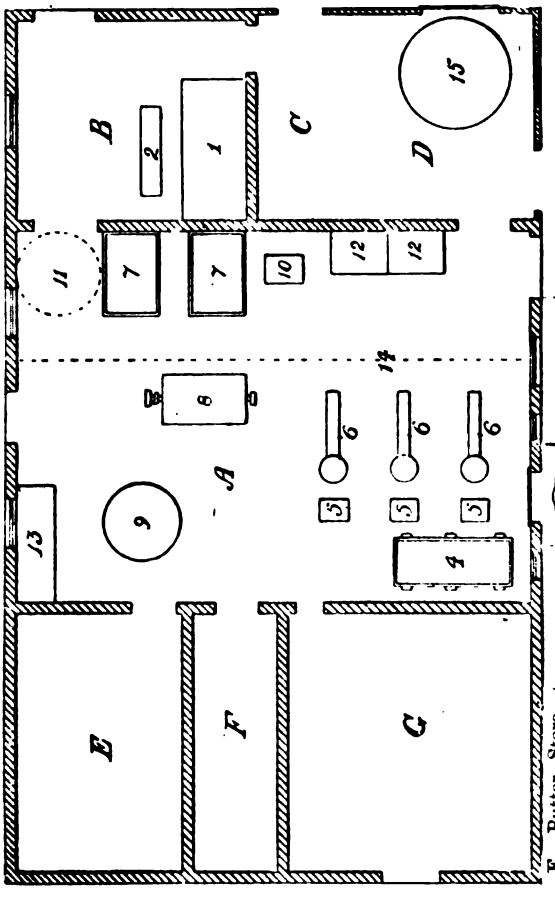
## PLANS.

The following sketches and plans illustrate the size and arrangement of the structure required for the carrying on of the business:—

### Fig. IX.

This Fig. shews the plan for a Creamery under the centrifugal separator plan of 500 to 700 cow capacity.




A.—Working Room, 36 ft. x 26 ft.;

B.—Boiler and Engine Room, 16 ft. x 14 ft.;

C. and D.—Shed for fuel and Skim-milk Tank, 19 ft. 6 in. x 14 ft.

E.—Butter Storeroom, 18 ft. x 12 ft.;

F.—Refrigerator Room, 18 ft. x 6 ft.;

G.—Ice House, 18 ft. x 17 ft.;

H.—Milk-weighing Platform, 3ft. 6 in. x 7 ft. and 4 ft. 6 in. high.

I.—Covered Roadway.

1. Steam Boiler; 2. Engine; 3. Weighing Can and Scales; 4. Milk Receiving Vat; 5. Heaters; 6. Centrifugal Separators; 7. Cream Vats; 8. Churn; 9. Butter-worker; 10. Milk Tester; 11. Water Tank, placed overhead; 12. Hot and Cold Water Tanks; 13. Table; 14. Line in floor towards which it falls from both sides; 15. Skim-milk Tank; 16. Butter-milk Tank in D.

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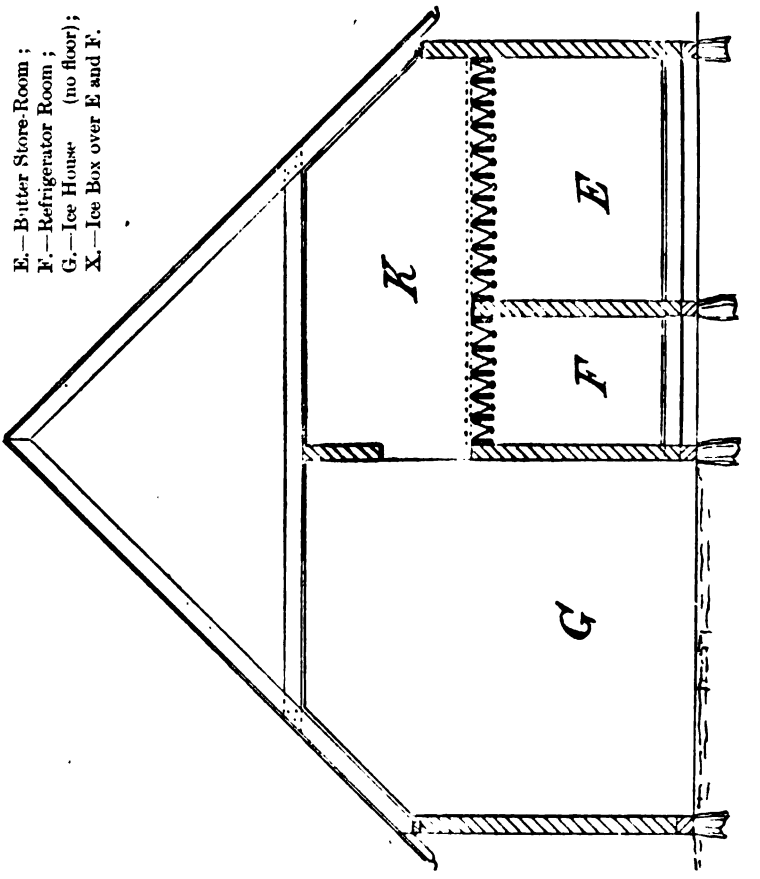
FIG. X.

**Fig. X shews a section of Figs. IX and VII.**




NOTE.—The ceiling in E and F is 7 ft. 6 in. high and is finished with joists, 2 in. x 10 in., placed 12 inches apart ; between the joists, V-shaped galvanised iron troughs are laid ; they are soldered over the top of every joist to prevent leaking ; to the troughs at the lowest points are attached small troughs, 1½ in. wide, to receive the drip from the condensation of water which takes place on the E and F side of the galvanized iron ; the troughs all have a fall of 1 inch to one side of the building, where the water from melted ice, and the water from the drip in the small under-troughs is received and conducted out. One door between G and K serves for the putting of ice into the Ice Box K. The partition between E and F prevents the butter in the Store-Room E, from being affected by the changes in temperature, which are consequent upon the frequent openings of the door, between F and the Working-Room, during working hours.

## BUILDINGS.

The buildings, floors, doors, &c., may be constructed in a manner similar to that described for a creamery on the cream-gathering plan, at pages 34 and 35.

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## EQUIPMENT.

Utensils for a creamery under the centrifugal separator plan of 500 to 700 cow capacity:—

Steam Boiler of 10 horse power.
Steam Engine of 10 horse power.
Water Injector.
1 Weighing can of 500 pounds capacity.
1 Milk Conductor.
1 Milk Receiving Vat of 3,000 pounds capacity.
Centrifugal Cream Separators of total capacity of 3,000 to 4,000 pounds per hour.
1 Babcock Milk Tester, or 1 Fjord's Controller.
Strainers for Cream Vat, for Churn, and Hair Sieve for Butter-milk.
1 Churn of 200 gallons capacity.
1 Butter Worker.
Weighing Scales—1 pair Platform Scales for Butter, 1 pair of Counter Scales for Butter, 1 pair for Salt.
2 Butter Spades, Butter Paddle, 2 Butter Ladles.
2 Thermometers, 2 Floating Thermometers.
Butter Printer.
Graduated Measuring Glass, 8 oz.
Stencil Plates and Brush for Branding.
Butter Trier.
3 Tin Pails.
1 Large Dipper, 1 Small Dipper, and 1 Strainer Dipper.
Shafting, Belting, Steam Pipes and Water Pipes connected with Hose.
2 Floor Brushes and Rubber Scraper.
1 Water Tank of 20 barrel capacity.
1 Cold Water Tank, 1 Hot Water Tank, and 1 Buttermilk Tank.
1 Skim-milk Heater and Cooler.
1 Skim-milk Tank of 6,000 pounds capacity.
1 Inspirator or Pump for elevating Skim-milk.

### MANAGEMENT.

The By-Laws, Rules and Regulations have set forth the nature of the management and the duties of most of the officers. These notes concerning the duties of the *butter-makers* and *milk-drawers* may be added:—

### *Duties of the Butter-Maker.*

1. It shall be the duty of the butter-maker to use his best endeavours to manufacture an article of uniformly fine merchantable butter.

2. He shall be responsible for and make good in money, any loss that may be sustained from the making of inferior butter through carelessness, neglect, or incapacity.

3. He shall keep a correct record of the weight of milk furnished by each *patron* and deliver the same to the secretary of the Company (or Association).

4. He shall test the milk of each *patron* from time to time, to assure himself that it is pure, wholesome, honest, and of good average quality.

NOTE.—A testing apparatus ought to be in every creamery operated upon the centrifugal-separator plan, whereby the quality of the milk for butter-making may be determined. The use of the Babcock Milk Tester is an efficacious, exact, simple, and cheap way of discovering the per cent. of butter-fat in milk.

5. He shall inspect the milk cans and report upon their condition to the Directors.

6. He shall inspect the milk waggons and report upon their condition as to cleanliness, &c., to the Directors.

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7. He shall enter in a pass book for each *patron*, a record of the weight of milk received in his or her name.

8. He shall keep the creamery and its utensils clean.

9. He shall care for the butter until the close of the manufacturing season; he shall see that all butter which is not in air-tight packages, is brined at least once every fortnight; and he shall use every reasonable precaution to maintain the temperature of the store room at a point where it is most suitable for the preservation of the butter.

10. He shall see that the skim-milk tank is thoroughly cleaned at least once a week.

11. He shall see that the surroundings of the premises are kept free from bad odours.

12. He shall use his best endeavours to advance the interests of the *manufacturer* and the *patrons*.

13. In case any of the *patrons* or directors shall find any of the utensils or the floor of the creamery in a filthy state, whereby the quality of the butter is liable to be injured, a sum of $1.00 for every such offence and every such utensil shall be deducted from the monies coming to the butter-maker from the *manufacturer*.

*Milk-Drawers.*

The agreement with the milk-drawers should stipulate:—

1. That they shall keep their milk waggons clean and free from all bad smells;
2. That they shall protect the milk-cans against damage;
3. That they shall use straps or ropes to prevent spilling or waste;
4. That they shall be liable for all loss incurred through their negligence or fault;
5. That they shall be liable to a fine of $1.00 for every time when they fail to reach the creamery at or before the stipulated time of 9 a.m., unless they furnish to the Directors a good and sufficient reason;
6. In a case where skim-milk is returned to the *patrons*, they shall apportion to each *patron* and deliver upon his milk-stand such quantities as may be decided upon by the butter-maker.

BY PRODUCTS.

The skim-milk and buttermilk may be disposed of according to any mutually satisfactory agreement between the *patrons* and the *manufacturer*. Skim-milk and butter-milk may be counted as having a feeding value equal to the production of five pounds of increase in live weight of swine per hundred pounds of milk. Where the skim-milk is returned to the *patrons* for the feeding of calves, it may be treated by a heater and cooler, so that it will be preserved sweet for 12 or 20 hours after it is returned.

REPORTS.

Statements to each *patron* of the particulars of his or her account with the *manufacturer* should be furnished to every *patron* when the distribution of the proceeds of the sale is made. At the close of the season, an annual statement of the business of the year should be furnished to the *patrons*. It should set forth:—

(1.) The number of days during which the creamery was in operation;
(2.) The number of *patrons* who furnished milk;
(3.) The total quantity of milk received;
(4.) The total quantity of butter manufactured;
(5.) The average price for which the butter of each month's make was sold;
(6.) The average quantity of milk required to make a pound of butter during each month;
(7.) The total value of the butter sold;
(8.) The total amount of money distributed to the *patrons*.

These facts should be supplementary to the information given in the annual statement of the Treasurer of the Company (or Association). Similar statements of the business of the Company (or Association), together with a summary of the

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Treasurer's report should be furnished annually to the office of the Dairy Commissioner at Ottawa.

TABLE showing the number of inches in depth, of Whey to be allowed in Milk Cans of different sizes, for Quantities of Milk from 30 to 360 pounds. The figures in the columns denote the inches of whey.

| WEIGHT OF MILK IN POUNDS. | DIAMETERS OF MILK CANS IN INCHES. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 20 in. | 19 in. | 18 in. | 17 in. | 16 in. | 15 in. | 14 in. | 13 in. | 12 in. |
| 30 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 5 | 6 |
| 35 | 2 | 3 | 3 | 3 | 3 | 4 | 5 | 6 | 7 |
| 40 | 3 | 3 | 3 | 4 | 4 | 5 | 6 | 6 | 7 |
| 45 | 3 | 4 | 4 | 4 | 4 | 5 | 6 | 7 | 8 |
| **50** | **3** | **4** | **4** | **5** | **5** | **6** | **7** | **8** | **9** |
| 55 | 4 | 4 | 5 | 5 | 6 | 7 | 8 | 9 | 10 |
| 60 | 4 | 5 | 5 | 6 | 6 | 7 | 8 | 9 | 11 |
| 65 | 4 | 5 | 5 | 6 | 7 | 8 | 9 | 10 | 12 |
| 70 | 5 | 5 | 6 | 7 | 7 | 8 | 10 | 11 | 13 |
| **75** | **5** | **6** | **6** | **7** | **8** | **9** | **10** | **12** | **14** |
| 80 | 5 | 6 | 7 | 8 | 8 | 10 | 11 | 12 | 15 |
| 85 | 6 | 6 | 7 | 8 | 9 | 10 | 12 | 13 | 16 |
| 90 | 6 | 7 | 7 | 9 | 9 | 11 | 12 | 14 | 17 |
| 95 | 6 | 7 | 8 | 9 | 10 | 11 | 13 | 15 | 18 |
| **100** | **7** | **7** | **8** | **9** | **10** | **12** | **14** | **16** | **19** |
| 105 | 7 | 8 | 9 | 9 | 11 | 13 | 15 | 16 | 19 |
| 110 | 7 | 8 | 9 | 10 | 11 | 13 | 15 | 17 | 20 |
| 115 | 8 | 9 | 10 | 10 | 12 | 14 | 16 | 18 | 21 |
| 120 | 8 | 9 | 10 | 11 | 12 | 14 | 17 | 19 | 22 |
| **125** | **8** | **9** | **10** | **11** | **13** | **15** | **17** | **19** | **23** |
| 130 | 9 | 10 | 11 | 12 | 13 | 16 | 18 | 20 | 24 |
| 135 | 9 | 10 | 11 | 12 | 14 | 16 | 19 | 21 | |
| 140 | 9 | 10 | 12 | 13 | 14 | 17 | 20 | 22 | |
| 145 | 10 | 11 | 12 | 13 | 15 | 17 | 20 | 23 | |
| **150** | **10** | **11** | **12** | **14** | **15** | **18** | **21** | **24** | |
| 155 | 10 | 11 | 13 | 15 | 16 | 19 | 22 | | |
| 160 | 11 | 12 | 13 | 15 | 16 | 19 | 22 | | |
| 165 | 11 | 12 | 14 | 16 | 17 | 20 | 23 | | |
| 170 | 11 | 12 | 14 | 16 | 17 | 20 | 23 | | |
| **175** | **12** | **13** | **15** | **16** | **18** | **21** | **24** | | |
| 180 | 12 | 13 | 15 | 17 | 18 | 22 | 24 | | |
| 185 | 12 | 14 | 15 | 17 | 19 | 22 | | | |
| 190 | 13 | 14 | 16 | 18 | 19 | 23 | | | |
| 195 | 13 | 14 | 16 | 18 | 20 | 23 | | | |
| **200** | **13** | **15** | **17** | **18** | **20** | **24** | | | |
| 205 | 14 | 15 | 17 | 19 | 21 | | | | |
| 210 | 14 | 16 | 18 | 19 | 21 | | | | |
| 215 | 14 | 16 | 18 | 20 | 22 | | | | |
| 220 | 15 | 16 | 18 | 20 | 23 | | | | |
| **225** | **15** | **17** | **19** | **21** | **24** | | | | |
| 230 | 15 | 17 | 19 | 21 | 24 | | | | |
| 235 | 16 | 18 | 19 | 22 | | | | | |
| 240 | 16 | 18 | 20 | 22 | | | | | |
| 245 | 16 | 18 | 20 | 23 | | | | | |
| **250** | **17** | **19** | **21** | **23** | | | | | |
| 260 | 17 | 19 | 22 | 24 | | | | | |
| 270 | 18 | 20 | 22 | | | | | | |
| 280 | 19 | 21 | 23 | | | | | | |
| 290 | 19 | 22 | 24 | | | | | | |
| **300** | **20** | **23** | **24** | | | | | | |
| 310 | 21 | 23 | | | | | | | |
| 320 | 21 | 24 | | | | | | | |
| 330 | 22 | | | | | | | | |
| 340 | 23 | | | | | | | | |
| **350** | **23** | | | | | | | | |
| 360 | 24 | | | | | | | | |

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# XIV.—REPORT OF THE ASSISTANT DAIRY COMMISSIONER.

(J. C. CHAPAIS, ESQ.)

ST. DENIS, QUE., December 31, 1890.

To Prof. JAMES W. ROBERTSON,
Dairy Commissioner,
Ottawa.

SIR,—In compliance with instructions which I have received from you, I beg to submit the following report, regarding the work which I have accomplished in my capacity as Assistant Dairy Commissioner for the Dominion. I was appointed to that position on the 1st of April, 1890; hence, my report covers a period of only eight months.

For the sake of clearness I have arranged this report in two distinct parts. The first contains a brief summary of my work since the date of my appointment. The second part presents the outline of a plan, of which a part has already been carried out, showing what is required to be done to promote the interests of the dairy industry.

## 1.—SUMMARY OF WHAT HAS BEEN DONE.

During these eight months, I devoted a large portion of my time to the delivery of lectures on dairy subjects in various parts of the Provinces of Quebec and New Brunswick in response to invitations which were received by me. Most of the lectures were given in the Province of Quebec, at the request of the Dairymen's Association of that Province, and in New Brunswick at the request of the Secretary of the Department of Agriculture there. They were delivered in the French language in the two provinces, mainly for the reason that I had been appointed Assistant Dairy Commissioner to meet the needs and wants of the French-speaking population of the Dominion, in connection with the development of that important industry. In all, I delivered 36 lectures, in 35 parishes or towns, situated in 17 counties. Of these, 26 parishes and 13 counties are in the Province of Quebec, and 9 parishes and 4 counties in the Province of New Brunswick. In the course of delivering these lectures, I met about 7,000 farmers, which gave me an average audience of 195 at each lecture. Below I have submitted the details of my visits:—

### PROVINCE OF QUEBEC.

| COUNTIES. | PARISHES. | COUNTIES. | PARISHES. |
|---|---|---|---|
| Beauce. | St. Ephrem. | Portneuf. | Cap-Santé. |
| " | St. Victor. | " | Deschambault. |
| " | St. Mary. | " | Portneuf. |
| Champlain. | St. Maurice. | " | St. Raymond. |
| Chicoutimi. | N.-D. de Laterrière. | Richelieu. | Sorel. |
| " | St. Alphonse. | Rimouski. | Bré. |
| Compton. | Cookshire. | " | Sacré-Cœur. |
| Dorchester. | St. Isidore. | " | St. Fabien. |
| " | St. Marguerite. | " | St. Mathieu. |
| L'Assomption. | L'Assomption. | " | St. Simon. |
| L'Islet. | St. Eugène. | Stanstead. | Ayers Flat. |
| " | St. Jean Port-Joli. | Témiscouata. | St. Arsène. |
| Lotbinière. | St. Pat. de Beaurivage. | " | St. Epiphane. |

### PROVINCE OF NEW-BRUNSWICK.

| COUNTIES. | PARISHES. | COUNTIES. | PARISHES. |
|---|---|---|---|
| Kent. | Buctouche. | Victoria. | Edmundston. |
| " | Cocagne. | Westmoreland. | Fox Creek. |
| " | St. Louis. | " | Memramcook. |
| " | St. Mary. | " | Shediac. |
| Northumberland. | Rogersville. | | |

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I was very much gratified by the interest and friendly attention with which my lectures were listened to upon all occasions. Everywhere, the farmers seemed to be anxious to learn how they could best succeed in getting out of the ruts of routine work, which in too many places has caused agriculture to become unprofitable.

Besides the time occupied in travelling and lecturing, I prepared a translation into the French language of the Report of the Proceedings of the Second Convention of the Dairymen's Association of the Dominion of Canada, which was held in Ottawa. I also translated the Dairy Bulletins issued by the Dairy Commissioner from Ottawa. My correspondence with farmers is continuously growing, and through that means I am able to give a great deal of direct information to correspondents, in reference to the best way of promoting a development of the dairy interests in their localities.

## 2.—PLAN FOR THE PROMOTION OF DAIRY INTERESTS.

What I am about to write in this second part of my report, refers particularly to the French settlements in the Provinces of Quebec and New Brunswick—the two provinces which I was able to visit during the year. The farmers and business men of the Dominion with whom we have to do, in the discharge of duties arising from our position, may be referred to as of four different classes:—

1. Farmers who are settled on new lands, to whom it is important that such methods of cultivation and husbandry should be taught as will prevent them from exhausting the virgin fertility of the soil;
2. Farmers on lands which have been under cultivation for long years and which have been in a measure exhausted by improper methods of culture, to whom it is important that a knowledge should be imparted of a system of agriculture whereby the lost fertility of the land can be restored to it;
3. Farmers living upon exhausted lands and who are already seeking to restore their productiveness, to whom it is most important that a knowledge of the best methods of how to do so should be made known, in order to assist them in that work and at the same time to enable them in the meantime to realise the largest possible profits from their labor and lands;
4. Business men, owners of butter and cheese factories, and butter and cheese makers, to whom it is important that there should be made known from some authoritative source the best methods for carrying on the manufacturing industry in dairying, in reference to all parts of the practice from the handling of milk to the preparation of the finished product for the market, and also how and where to dispose of these products to the best advantage.

I will now say a few words about each of these classes and mention the work which I consider should be undertaken to make their position better.

### 1. *Farmers,—Settled on New Lands.*

There are three important things which ought to be taught to that class of farmers. The first is,—that all lands from which we draw crops of grain year after year continuously, without giving them rest, and from which the grain is all sold on the market, are inevitably doomed to a rapid exhaustion of fertility. The second is,—that in the Provinces of which I am now speaking, the modification of the system of continuous grain-growing and grain-selling into another system, which would consist in the rearing of cattle for meat production, is not yet profitable to the farmers, because the feed which they must gather to feed cattle during the seven months of stabling in winter, costs too much, to leave any profit from the sale of fattened cattle at the actual prices that may be obtained, since they have to compete with cattle breeders and feeders of the west, who can obtain the feed required for the fattening of their cattle at a very low cost. The third is,—that dairying which admits of the carrying on of mixed farming on the land and of consuming on the farm all of its coarse products, and of manufacturing from them through the medium of milking cows concentrated products, (which are profitable to sell on the market



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while leaving for the soil the by-product of manure for the enrichment of the land), is the only husbandry which enables the farmers occupying new lands to cultivate them at a profit without exhausting the soil. At the same time dairying yields a sufficient profit to permit the return to the land, of some chemical fertiliser to replace that portion of its fertility which has been removed by the sale of milk and cheese. I have been called upon to demonstrate, that that can be done in one or two places; and there is no doubt that, through the medium of Bulletins like those which we began to publish this year,—and in which the question may be thoroughly and as simply as possible discussed and presented,—we may prevent a large number of settlers from falling into the mistakes of their forefathers, who from having followed the old system, have been obliged to leave their exhausted lands and emigrate.

2. *Farmers,—Owners of Exhausted Lands.*

There is no doubt that it is more difficult to induce a farmer of this class to accept a new method, than one of those mentioned under the last heading. Indeed, he who has come to the verge of ruin through routine and ignorance, feels the bad effects of his continued ignorance without seeking to account for the causes. Too often, he imputes to bad years, unfavourable seasons, the use of poor seed, an evil of which he himself is the only author. He must, therefore, be brought to make a thorough study of his own case in order to recognise his mistakes. We must make him know the value of manure; the necessity of producing and of keeping it in good condition for application to the land; and the methods of obtaining large quantities of it by manufacturing on the farm all coarse products of crops, instead of selling them. The inexorable law requires that we should give back to the land an equivalent of what has been taken from it. Lastly, he must be convinced that dairying is the only industry which in the actual state of markets, is competent to regenerate agriculture for him, for the reasons which have been set forth in the preceding paragraph.

If, to demonstrate these things to the farmers, lectures be given in clear, concise and unpretentious language, there is no doubt but that Bulletins explaining the same principles and corroborating the teachings of the lecturer are useful for carrying on the good work. Their influence is felt specially in those places where the farmers unite in one common endeavour to form associations, clubs or institutes, in which they can discuss together the new aspects of questions which have been put before them by the lecturer or the Bulletins.

3. *Farmers,—Owners of Exhausted Lands but who are engaged in the work of Restoration.*

It is much easier to help this class of farmers to improve their condition. Having reached the conviction, through their first efforts towards improvement that there are new methods which provide a means for restoring to the land its lost fertility, they desire to acquire further knowledge of these methods and also to put them into practice. An important matter for the lecturer, when he is before this class of farmers, is to proceed by way of demonstration and illustration. There is no place, no matter how far behind the age it may be, where there is not at least one farmer shrewder than the others, who farms—if not to perfection—better than his neighbours. To explain why he has more success, to show how he can do still better by improving the methods by means of which he has commenced to ameliorate his condition, is sufficent to induce others to strive to do like him, that they may also with certainty succeed. The first things to be remedied are want of drainage, want of manure, want of cattle. As a rule, farmers of this class are those who come most willingly to hear the lectures given, who desire to get the Bulletins, who take an agricultural paper, and who are most easily convinced of the advantages that arise from uniting in associations, such as the agricultural clubs, which exist in large numbers in the Province of Quebec. They consist of Parish Associations, and are similar to the Farmers' Institutes which have been organised in the Pro-

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vince of Ontario in the form of county associations. These associations or clubs are of great benefit, by making the experience of many available for each, by providing for discussions of the different methods of farmers in the neighbourhood, by procuring Bulletins and agricultural papers, by making provision for clubs through which to buy new seeds, improved agricultural implements, and cattle of good breeds. By these and other ways, they help to promote great and rapid progress towards improvement in agriculture.

Those farmers who have already realised the benefits from association, are those who are most easily brought to form such associations for the manufacturing of butter and cheese. They open co-operative factories, bring their milk to them, take care to engage first-class makers to manufacture their products, are desirous to secure a good market, and from that time on they are sure to succeed and see prosperity taking the place of ruin. An example will find its place here. In 1880, there was not a single butter or cheese factory in the eastern part of the Province of Quebec. Nearly everywhere in that region, agriculture was at the lowest possible condition. In that year a cheese factory was opened in one of the parishes situated below Quebec. That parish, being about 6 miles by 3 miles in area, contained about 200 cows of which the milk was available for the factory. At that time each cow gave for 6 months of the year enough milk to yield an average of 40 pounds of butter for the season. That butter, generally of poor quality, was worth from 12 to 15 cents per pound. It is easy to calculate what poor returns were realised, or rather what real loss was sustained by the farmers under such a condition of things. The factory experienced some drawbacks. There was much prejudice to uproot, but the days of trial passed over, and to-day in that same parish, where there were only 200 cows 10 years ago, we find 600, which instead of yielding each about $6.00 worth of butter, realise $20.00 each. For the whole parish the yield, from sales of butter and cheese, instead of being $1,200 per year as it was 10 years ago, is now $12,000. This is a result obtained by intelligent farmers,—a result which can be obtained by all farmers who will adopt the same measures and methods.

### 4. *Business Men, Factory Owners, and Cheese and Butter Makers.*

Where the farmer has adopted the safe principles for the improvement of agriculture, which have just been mentioned, and has realised the necessity for engaging in dairying, he must be furnished with the means for drawing from that industry first-class products and of getting from them the largest possible profit. To reach such a condition of things, we must look for another class of men, who, although they are not farmers, are nevertheless one of the most important factors in the system of dairy farming. After the farmers have been brought to produce a large quantity of milk, it is necessary to prove to them that more profit may be derived from that milk when manufactured in a factory than when it is handled in a private dairy. Many places still need to have that matter presented and proven to them. To make it clear, one of the best ways is to promote the opening of first-class factories in sections where there are none; even if it be necessary for the Government to grant some money, to insure the opening of a first-class factory, it would be a good policy to do so. In fact, it has been done already and with the best of results. Indeed, when farmers are not sufficiently enlightened concerning the benefits of the system as represented in lectures and bulletins, there is no other way than to enable them to put their fingers on the profits. When a factory is opened and a few farmers have decided to bring their milk, the attention of the others is quickened. The wife of a neighbour is no longer obliged to spend one-third of her time, and often more, in a dairy. Butter and cheese made at the factory are of first-class quality; the price paid for them is higher, the money comes in every month, instead of at the end of the season; the quantity of butter or cheese obtained from 100 pounds of milk is larger; and finally, the veil is torn, the blind see, and everybody is soon a believer in the benefits from co-operation. The first step has been made, but it is only a first step, and unfortunately it is followed very often by a retreat;

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and why so? Because after a good start, the thing has been managed badly. The first year a good maker had been engaged, but a false idea of economy prevailed, and the following year a less skilful maker was engaged at cheaper wages; and the result has been an inferior product. Hence, well-grounded complaints have arisen, recriminations have been made, and the end has been a ruined enterprise. Factory owners and butter and cheese makers must, therefore, be equal to their tasks. They must know the nature of a model factory, and they must strive to make their own a model in every respect. They must be instructed in the best methods for the erection and equipment, informed of what are the most improved apparatus, the most successful methods of manufacture, and the best tests whereby to discover the true value of milk, in order to pay for it according to its true value for butter-making or cheese-making. They must also learn to test milk, so as to prevent the frauds which are too often committed by the patrons who furnish adulterated milk.

Besides, from a general point of view, not only must they have a first-class product in every factory, but they must attain a certain uniformity of quality and appearance in the product of a whole county, a whole district, a whole province. Further, they must know how to put up the product in such a way that it may be as the markets want it. The market must be well known and supplied with what it requires at the time it is required.

To attain all that, butter and cheese makers must learn their business quite thoroughly; and to learn it, they need schools of some sort, that they may be able to go to these schools and get practical and theoretical instruction. Instructors must be trained in the Experimental Dairy Stations, and they should afterwards go and teach in the dairy schools what they have learned themselves. After the makers have left the schools, they must keep up with the progress of science and be looked after, in order that they may not become careless. Consequently, travelling inspectors are necessary to visit their factories, to keep them well posted respecting new methods coming into use every year and to detect any negligence that may exist. I will illustrate by an example how such instructions are useful and give good results. Last June, the Dairy Commissioner for the Dominion had called together at St. Alphonse, Chicoutimi County, Province of Quebec, 20 cheese-makers of that district, to give them a practical and theoretical lesson in the manufacture of cheese. A whole day was spent in that work, after which everybody went home. Last October, I had occasion to meet a patron of a cheese factory, the maker in which was present when the above mentioned instruction in cheese-making was given. I inquired from that patron if cheese had sold for a good price in his district during the last season. He replied: "Prices have been satisfactory every way at our factory, the cheese of which has been sold since July for 1 cent a pound higher than those of all the other factories in the neighbourhood. I asked what was the reason of that. "It is" said he "because our maker was present last June at St. Alphonse, where a lesson in cheese-making was given there by the Dairy Commissioner; and that lesson has been of such service to me that I have improved my method of manufacturing, enough to enable us to get that advance in price of 1 cent per pound of cheese made since. This is enough to illustrate what may be the result from a system of instruction and inspection regularly carried out.

To attain uniformity in quality and appearance in the cheese of a county, of a district, and of a whole province, we must get uniformity in the method of manufacture, which can be secured by the formation of syndicates of factories, having at their head an inspector over each Syndicate; these inspectors having over them a general inspector for each province. Those general inspectors can derive guidance for their work from the information collected and disseminated from the Dairy Department under the superintendence of the Dairy Commissioner. And to unite all those having some interest in dairy matters, it is important to organise district associations of dairymen, where farmers, butter and cheese makers, factory owners, inspectors and instructors may meet together in local or general conventions.

I desire to recapitulate this last part of my report, this programme which is followed in many of its parts, in a few districts of the Dominion and which

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is still unknown, but should be known and followed in a greater number of districts; lectures to be given before farmers' meetings to teach to those having new lands, how to maintain their fertility; to those who have exhausted lands, how to improve them; to those who have begun the work of amelioration, how to avail themselves of the co-operative system, to attain progress and profits more quickly and surely by means of agricultural clubs, farmers' institutes and associations, through which they may receive sound practical directions; and to owners of factories and to butter and cheese makers, theoretical and practical instruction to keep them well posted respecting the progress of their industry; the creation of dairy schools to train first-class makers; the establishment of experimental dairy stations to make analyses, tests and to gather all the information necessary to keep the instructors and inspectors to the front in a knowledge of the best methods in dairying brought to light every year through the help of scientific research; the publication and diffusion by the Dairy Department of bulletins treating on all matters of interest to those who are engaged in dairying; investigations to find an opening in foreign markets to dispose of the products of the dairy industry in the most advantageous manner; encouragement to the development of dairy interests by grants judiciously distributed to those who will labour in that direction.

This programme is one that requires the co-operative help of everybody, from the most backward farmer to the most prominent of our legislators, in order that it may be carried out successfully. It has been presented in part upon former occasions—and one might think it is useless to repeat it in this report—but, if it is a well known programme amongst the farmers who are foremost in making progress in their work, it is very little, if at all known by those who have greatest need of the help which it seeks to render, and it is in order that it may reach them, that I have entered upon these long details of it in the present report.

I have the honour to be, Sir,

Your obedient servant.

J. C. CHAPAIS,

*Assistant Dairy Commissioner.*

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APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

# SECOND ANNUAL REPORT

OF THE

# DAIRY COMMISSIONER

FOR THE

# DOMINION OF CANADA

FOR

## 1891-92

*PRINTED BY ORDER OF PARLIAMENT*

OTTAWA:
PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST EXCELLENT MAJESTY
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Hon. J. G. Bourinot

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# APPENDIX

TO THE

# REPORT OF THE MINISTER OF AGRICULTURE

BEING

## REPORT OF THE DAIRY COMMISSIONER.

---

OTTAWA, 30th April, 1892.

The Honourable
The Minister of Agriculture.

SIR,—I have the honour to submit my second annual report as Dairy Commissioner for the Dominion of Canada.

During the year an increasing interest in dairying and its allied branches of farming has been awakened and maintained in all the provinces. Upon your recommendation the Government approved of the plan for the establishment of Experimental Dairy Stations in different parts of Canada, as outlined in the memorandum which I had the honour to submit on 5th January, 1891, and of which a copy appears in my annual report for 1890, at page 132. Parliament made adequate provision for the maintenance of that work in the appropriations for the year.

I was fortunate in securing the services of some of the most capable, energetic and trustworthy men who were available. Messrs. J. A. Ruddick, T. J. Dillon, John Robertson, J. B. McEwan, C. C. Macdonald, C. F. Whitley and J. W. Wheaton were engaged. Their reports upon the work which was entrusted to their care are included in this volume. Mr. J. W. Hart was engaged as an expert butter-maker, to give general assistance in experimental dairy work at the Central Experimental Farm and at the branch Experimental Dairy Stations.

### SUMMARY OF THE WORK IN ONTARIO.

It was considered expedient to overtake some work of instruction at the cheese factories and creameries in the different provinces, before the dairy stations could be established with advantage. In pursuance of that plan, 194 cheese factories and creameries were visited by my assistants. The following circular which was issued, sets forth the objects of the preliminary system of instructing cheese and butter-makers at central factories.



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OFFICE OF THE DAIRY COMMISSIONER,
DEPARTMENT OF AGRICULTURE,
OTTAWA, 1st May, 1891.

DEAR SIR,—The following are the dates, as far as they have been arranged, upon which the superintendents of experimental dairy work will visit cheese factories in Ontario:—

The object of these visits is to give instruction in the best methods of testing milk and manufacturing cheese of fancy quality, over as wide an area in as short a time as is practicable. This itinerant work has been undertaken as preliminary to the experimental investigations which will be carried on at several factories during the later parts of the manufacturing season.

Each of the superintendents will be furnished with a Babcock milk-tester, and other new and useful apparatus, for enabling cheese-makers to discover both the quality and condition of the milk which they handle.

All cheese-makers from the other factories in the several districts are invited to meet one of the superintendents at the place which is most convenient to them. A public meeting of the patrons and others may be called by the cheese-maker, or other representative, at these factories, for the afternoon of the dates which are marked *. At these meetings a demonstration of milk-testing will be given, and information on the best methods for the care and preparation of milk for cheese factories will be furnished.

*Western Ontario.*

| Cheese Factories. | Dates. | | |
|---|---|---|---|
| Brownsville | May | 14* | 15 |
| Ingersoll (Ireland's factory) | " | 18* | 19 |
| Newry (Morrison's factory) | " | 20 | 21* |
| Bluevale | " | 22 | 23* |
| Goldstone | " | 25 | 26* |
| Harriston | " | | 27* |
| Kenilworth | " | | 29* |
| Dundalk | June | 1* | 2 |
| Cookstown | " | | 3* |
| Attorcliffe station | " | 4 | 5* |
| Norwich | " | 9* | 10 |
| Thames (near Nilestown) | May | 18* | 19 |
| Avonbank (Muir's factory) | " | 20 | 21* |
| Geary's (near London) | " | 22* | 23 |
| Appin | " | 25 | 26* |

*Eastern Ontario.*

| | | | |
|---|---|---|---|
| Graham's (near Belleville) | May | | 19* |
| Front line of Sidney | " | | 20* |
| Plainfield | " | 22* | 23 |
| Shamrock (near Stirling) | " | 25* | 26 |
| Wellman's Corners (Whitton's factory) | " | 27* | 28 |
| Madoc | " | | 30* |
| Lakefield | June | | 2* |
| Brighton and Murray | " | | 4* |

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| Cheese Factories. | Dates. | | |
|---|---|---|---|
| Mallorytown | May | | 19* |
| Willow (near Brockville) | " | 21* | 22 |
| Old Fairfield (near Easton's Corners) | " | | 23* |
| Perth | " | 25* | 26 |
| Kemptville (Bush's factory) | " | | 27* |
| Van Camp (near W. Winchester) | " | | 28* |
| North Williamsburg | " | 29* | 30 |
| Delta | June | | 2* |
| Newboro' | " | | 3* |
| Napanee | " | 5* | 6 |
| Newburg | " | 8 | 9* |
| Elginburg | " | 10* | 11 |
| Marysville (Wolfe's Island) | " | | 12 |
| Inverary | " | 13* | 15 |
| Lecture at Sunbury evening of 15th. | | | |
| Pitt's Ferry | " | 16* | 17 |

All communications and reports should be addressed to the Dairy Commissioner, Central Experimental Farm, Ottawa.

---

This movement in Ontario was followed up by the commencement of experimental investigations into the process of making Cheddar cheese. The cheese factory owned by Mr. C. A. Matheson, Perth, Ont., was selected in Eastern Ontario; and Geary's factory, owned by John Geary, Esq., London, Ont., was chosen in Western Ontario.

Mr. J. A. Ruddick was in charge at Perth, and Mr. T. J. Dillon at London. Some particulars of the experiments which were undertaken, and of the information which was derived from them, will be found in the report of Mr. Ruddick. I have reserved the publication of the conclusions which were reached after examining the cheese upon several occasions, until the experiments are repeated and the investigations carried on further during the current year of 1892. Special importance is attached to our investigations into the quantities and qualities of cheese which may be obtained from milk containing different percentages of butter-fat. It is hoped that we may be able to draw conclusions from the experience of our investigations for two years, which will not be misleading or incorrect. The report of Mr. Ruddick has been prepared under my direction, and contains all that is immediately valuable for dairymen to know of the nature and results of our experiments in that matter.

Shipments of the cheese from Perth and London were made to the British markets, where they excited most favourable attention from the trade and received high commendations in the press. The cheese which were made during July and August were consigned to Messrs. A. Clement & Son, of Glasgow (with branches at Manchester, London, Liverpool and Newcastle), and sold at an average price of 53s. per cwt. Part of them were sent to Manchester and London. A form similar to the one on the next page was sent to many of the leading retail provision dealers with the cheese, and some useful data is being collected from the replies which have been received from them.



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## REPORT ON CHEESE FROM THE EXPERIMENTAL DAIRY STATIONS OF CANADA.

(Made for Messrs. ANDREW CLEMENT & SON, GLASGOW, by:

Date of examination .....189 .

Brands on cheese....., Date on cheese....., Lot.....

| | Perfection. | Points Awarded. | Remarks. |
|---|---|---|---|
| Flavour..... | 40 | | |
| Body or quality..... | 25 | | |
| Texture..... | 15 | | |
| Colour ..... | 15 | | |
| Appearance..... | 5 | | |
| | 100 | | |

GENERAL NOTES.

The most noticeable faults and defects are:—

The good qualities which are worthy of particular mention are:—

Recommendations:—

(Signed)

### WINTER CREAMERIES.

As soon as practicable an effort was made to follow out the original plan of Experimental Dairy Stations in reference to winter butter-making. At the close of the ordinary cheese-making season, arrangements were made with the proprietors and patrons of two cheese factories to alter their factories, fit them up for the manufacture of butter, and run them as creameries during the winter. Full particulars of the alterations which are necessary to equip cheese factories as creameries are given hereafter.

*Mount Elgin Creamery.*

At Mount Elgin, Ont., the joint stock company who own the factory agreed to put it into repair suitable for being occupied during the cold weather of winter. I agreed to put in the necessary butter-making apparatus and utensils, which the company have the privilege of purchasing at a price to be agreed upon. The business basis upon which the butter-making was to be carried on is set forth in my letter-

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to the president of the Mount Elgin Cheese Factory Company, of which the following is a copy:—

OFFICE OF DAIRY COMMISSIONER,
CENTRAL EXPERIMENTAL FARM,
OTTAWA, 26th November, 1891.

LEWIS A. PRICE, Esq.,
President Mount Elgin Cheese Factory Company,
Mount Elgin, Ont.

DEAR SIR,—In accordance with the proposition which I made at the public meeting of the patrons and others, held at Mount Elgin, for the purpose of discussing the desirability of running the cheese factory there as a creamery during the present winter, I desire to state:—

1. The making room and boiler room of the present cheese factory are to be altered and sheeted on the inside, in accordance with my memorandum to Mr. Pow, the cheese-maker there, at the expense of the company owning the premises. The whole amount for this purpose is not expected to exceed $200 or $250.

2. I agree to pay $100 of rent for the use of the premises for the winter season of 1891–92; and further to provide the lumber for the ceiling of the making room.

3. I agree to put into the factory the necessary apparatus and equipment for the manufacture of butter.

4. Such apparatus and equipment may become the property of the company when the butter-making season is ended, by mutual agreement as to price, or I may remove the same.

5. The company shall keep the building fully insured, as usual, for their own benefit.

6. I agree to remove the butter-making apparatus and utensils, and to leave the building in at least as good a state for cheese-making as it was when I took possession of it for butter-making, at any time when notified to do so after the middle of April, 1892.

7. I agree to manufacture butter from the milk furnished at the factory by the patrons of the factory and others, at the rate of three cents per pound for all the butter which is manufactured. That three cents per pound is the manufacturing charge for all labour, furnishings, tubs, fuel, &c.

8. I further agree to ship the butter to some point or points in Great Britain, and have it sold there to the very best advantage, and to pay to the patrons who furnish milk the full net sum realized from such sales, after deducting the shipping expenses from Mount Elgin to the destination of the butter and the three cents per pound for the manufacturing charge.

9. After the end of every month the books will be made up, and an advance of fifteen cents per pound of butter will be made to the patrons. The division of proceeds from all sales of butter will be made to each patron in proportion to the quantity of butter which is obtained from the milk furnished by him, as determined by the Babcock milk-tester. Whatever balance over the fifteen cents per pound may remain at the close of the season will be distributed to the patrons upon the same basis.

10. The patrons will receive at the factory about 80 pounds of skim-milk and 10 pounds of buttermilk per 100 pounds of milk furnished. In case the buttermilk should be sold, it will be accounted for to the patrons, and the proceeds distributed to them in proportion to the quantity of milk furnished.

I may further state that in case arrangements be made with the company and the patrons for the running of the factory for another season—1892-93—I will agree to pay a rental of $100 for the premises for that season.

I am, yours very truly,
JAS. W. ROBERTSON,
*Dairy Commissioner.*

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In accordance with the agreement with the Mount Elgin Cheese Factory Company, the factory was altered and fitted up for the manufacture of butter. The expenses which were incurred by the company in fitting the cheese-making room and press-room for use during the winter, and which were estimated in my letter at $200 to $250, were greater than would be required at most cheese factories, where the making room is sheeted inside with matched lumber, or is plastered and is in a reasonably good state of repair.

*Apparatus for a Creamery.*

The apparatus required for the fitting up of a well appointed cheese factory for the manufacture of butter upon the centrifugal cream separator plan and the approximate cost are given underneath. The price placed opposite to many of the articles is the price which was charged to the Government. A private individual or company, in some instances, could not purchase them quite as cheap; but in the aggregate the cost of making the alteration and putting in the machinery, apparatus and utensils which are required, need not exceed the amount which has been mentioned.

| | |
|---|---|
| 1 Centrifugal cream separator (capacity 3,000 lb. of milk per hour) | $330 00 |
| 1 Milk-receiving and heating vat (300 gallons) | 55 00 |
| 2 Cream vats (200 gallons each) | 80 00 |
| 1 Revolving churn (250 gallon size) | 41 00 |
| 1 Power butter-worker | 55 00 |
| 1 Hand butter-worker | 9 00 |
| 1 Pair butter scales | 8 50 |
| 1 Large dipper, 1 small dipper, 1 strainer dipper, etc | 5 00 |
| 2 Butter spades, 2 butter ladles, 1 butter packer, etc | 2 00 |
| 1 Butter printer (lettered) | 5 00 |
| 1 Butter trier | 4 00 |
| 1 Strainer for cream, 1 hair sieve | 3 00 |
| 1 Four-gallon cream-fermenting can | 6 00 |
| 1 Buttermilk tank | 6 00 |
| 1 Elevated skim-milk tank, with pipe and valve for conducting milk to waggons | 15 00 |
| 1 Stove | 10 00 |
| Stencil-plates | 3 00 |
| Carpenter-work, shafting, pulleys, belting, hangers, pipes, fittings, freight and teaming | 153 00 |
| | $790 50 |

In some cheese factories the articles which are mentioned below do not form part of the equipment. They are really essential for carrying on the business in the best way, and should not be counted as a charge upon the cost of altering a cheese factory and fitting it for butter-making, although they are necessary in the butter factory:

| | |
|---|---|
| 1 Babcock milk tester | $22 00 |
| 1 Ejector for scalding and elevating the skim-milk | 9 00 |

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The patrons delivered the milk at the creamery and carried home the skim-milk in the same milk cans. After the first few days, the necessary delay to obtain the skim-milk did not exceed 15 minutes.

The creamery commenced operations on 4th December, 1891, and cheese-making was resumed after 9th April, 1892.

Fifty-two patrons supplied milk.

The total quantity of milk received was 245,142 lb.

The total quantity of butter manufactured was 11,062 lb.

The average percentage of fat contained in the milk was 4·07 per cent.

The milk from different patrons varied from 6 per cent to 2·4 per cent of fat.

On the same day the widest difference between the milk from two patrons was,—one lot 5·2 per cent and another lot 2·6 per cent of fat.

The average number of pounds of milk required to yield a pound of butter in each of the months was as follows:—

December—21·38 lb. of milk per lb. of butter.
January —20·68 " " "
February —22·68 " " "
March and April—25·41 " "

Every pound of butter-fat in the milk yielded 1·1 lb. of marketable butter.

Shipments of the butter were made to Liverpool, Montreal and Vancouver, B.C. The first shipment to Liverpool was consigned to Messrs. A. Clement & Son, of Glasgow, and was distributed to different cities in Great Britain. Full account sales have not been received, but an interim report mentioned that the butter from Mount Elgin creamery was selling for 123s. per cwt. (112 lb.)

From a later shipment to Liverpool through Messrs. J. L. Grant & Co., of Ingersoll, to be sold by Messrs. Grant & Boyd, of Liverpool, account sales have been received. The butter sold for 124s. per cwt. That was equal to 26·57 cents per pound with the rate of exchange at $4.80 per £.

The expenses incurred were equal to the following rates per pound of butter from the factory:—

| | | | |
|---|---|---|---|
| Two months' discount | ·22 | per lb. of | butter. |
| Freight charges and duc... | ·67 | " | " |
| Receiving, weighing, railway carriage, &c. | ·20 | " | " |
| Commission and guarantee, 4 per cent | 1·05 | " | " |
| Loss in weight | ·35 | " | " |
| | 2·49 | | |

The total expense (including transportation, selling commission, discount and shrinkage, between Ingersoll and the ultimate selling points) was equal to 2·49 cents per lb. of butter.

The shipment which was sent to Vancouver, B.C., sold for 30 cents per lb. there. The freight charges, selling commission, &c., cost 6 cents per lb., which left 24 cents per lb. at Ingersoll station.

The following comments on the quality and condition of the butter from Mount Elgin creamery have been received:—

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From Messrs. A. Clement & Son, Glasgow:—"I am glad to say your first shipment of butter, marked E.X.1., gives good satisfaction, notwithstanding we have to contend against the name 'Canadian,' which has to fight against the prejudice of shopkeepers that are only used with stale, stored goods. We have sent samples to Leeds, Bristol, Leith, Dundee, &c., besides our own places. I enclose you note received from Manchester."

From Messrs. H. Hargrave & Son, Manchester:—"With reference to your inquiry about our opinion of the Canadian butters, we are very pleased with the quality, and consider them the finest we have ever seen from Canada. There is a good opening in this district for a butter of this class, if shipped perfectly fresh, and if made carefully, so that the quality of each package is regular. We do not think this butter will compete against Danish, owing to the longer time taken in transit, but we think it will make a good second, and we consider it very much superior to Australian or New Zealand butters."

From the *Northern Counties Grocers' Review*, 8th March, 1892:—"Canadian Produce.—Some time ago we commented on the fact that the experimental dairy stations belonging to the Dominion Government of Canada had been very successful in their efforts to improve the quality of the cheese sent to this market, and we are very glad to find, if we may judge from a first consignment of winter-made creamery butter from the same source, which is being shown by the agents here, Messrs. A. Clement & Son, 4 Greenwood street, Manchester, that they are likely to be quite as successful in their efforts in bringing to perfection the system of winter dairying, as practised in Denmark and Sweden. The quality of the butter received is distinctly fine, one of the lots especially being the finest Canadian butter ever seen on this market. Several leading experts have expressed themselves as being both surprised and pleased with it. The only fault which can be found with it is in the colour, which is rather high, but this probably could be easily remedied. If bulk can be sent equal to the parcel, it would be welcomed by the trade generally."

From *The North British Grocer and Provision Trade Journal*, 2nd April, 1892:—"The Government of Canada resolved about a year ago to establish experimental dairy stations in the different provinces of the Dominion, the chief object being to effect an improvement on the quality of Canadian butter. For this purpose the premises of two cheese factories, one at Woodstock, the other at Mount Elgin, Ontario, were altered and specially fitted, and the farmers of the district have been giving their hearty support to the project. The chief part of the produce is designed for export, and the Canadian Government hope within a short time to see the trade enlarged until it equals that of the growing cheese industry. The first shipment of the winter-made butter, amounting to 10,000 lb., has been received by Messrs. Clement & Son, of this city. The butter, which is light salted, is of good body and fine flavour, and is tidily, neatly and cleanly packed in handy little tubs, containing about a stone weight and upwards."

From *The Glasgow Evening Citizen*:—"The Canadian Butter Industry.—Canada, it seems, is about to enter our butter market as a serious rival to Denmark, and it may even be to Ireland. Twelve months ago the Government of the Dominion resolved, by means of its agricultural department, to establish a series of experimental dairy stations in the different provinces of both Upper and Lower Canada, the main object of these being to effect an improvement in the quality of Canadian butter. The first shipment of 10,000 lb. to this country of butter made in these stations was recently consigned to Messrs, Clement & Son, of Glasgow. So bright do the prospects of the new industry look that the directors of the Agricultural Department of the Dominion Government expect that, say in three years' time, the butter export will amount in value to something like a million dollars."

From *The Bailie*, Glasgow, 13th April, 1892:—"Messrs. Clement & Son, of this city, who have also branches in London, Manchester and Newcastle, have just received a first shipment of 10,000 lb. of winter-made creamery butter from Canada. Up till recently butter-making was regarded as an outside accomplishment by the Canadian farmer. He took to it at odd moments, and if the truth must

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be told, the butter bore distinct evidence to the hap-hazard system in which it had been manufactured. Twelve months ago, however, the Government at Ottawa resolved that the industry should be put on a different and better footing. Experimental dairy stations were established in the several provinces, so as to assist in the development of winter dairying; co-operative creameries were started, and other steps were taken so that Canadian butter might by and by take a position in the British and other markets similar to that occupied by Canadian cheese. Hearty support has been given to the movement by the farmers in the Dominion, and now, at the end of the first season, all concerned are thoroughly satisfied with the proceeds and prospects of the movement. On this side of the Atlantic the butter will be warmly welcomed. Not only is it excellent in quality, but its price is such as to recommend it to every householder over the length and breadth of the land."

Later, from Messrs. A. Clement & Son, Glasgow:—"I hope you will not send any more before the beginning of December. We distributed the first shipment as widely as possible, to get the opinion of different districts, and from some of them we have not got returns yet. In England, especially, it is very difficult to introduce anything new, but I am quite satisfied that if the butter was made with a fair proportion of new-calved cows' milk, and made in such quantities that it could be shipped every week, that it would bring an equal price to Danish, and find a ready market.

"The butter trade is an increasing one, and notwithstanding a substitute in margarine, there is an enormous demand for fresh-made butter, that will always command a good price from the 1st of December to the 1st of April. Ireland supplies us well with summer stock. Stored butter now will not sell at all; hence the trade have ceased to hold summer make, and buy fresh-made winter stock."

The main and practically the only defect which was discernible in the quality of the butter was the absence of a full rosy flavour, which is called by the trade "bouquet of fresh-made butter." At the Central Experimental Farm experiments were conducted during the autumn and early winter with three groups of cows at different stages of lactation. The butter which was made from the milk of cows which had been calved longer than six months was deficient in rosy rich flavour. It was decidedly inferior to the butter made from the milk of cows of the same breeds fed upon the same quality of feed, but which had been milking only from one to three months. The addition of the milk of even one fresh-calved cow to the milk from a number of others which are at advanced stages of their milking period, has the effect of improving the flavour of the butter made from the mixed milk. At the Mount Elgin creamery the milk which was furnished from December until after 18th February was all from cows which had been milking for periods of four, six to eleven months. The addition of the milk from a dozen fresh-calved cows to the whole quantity of milk received daily would have improved the flavour very much and added to the value of the butter in the English market. It will be easy to overcome the defect in the flavour of the butter next season, in the way which has been suggested.

A number of cheese-makers availed themselves of the opportunity of visiting these creameries and learning the art of butter-making to some extent. Every one who cared to go was welcome to learn all he could of the art of making butter, in order to fit himself for carrying on the business in his cheese factory when the alteration comes there also.

*Woodstock Creamery.*

At Woodstock Ont., the premises of the East and West Oxford Cheese and Butter Manufacturing Company were secured upon terms somewhat similar to those

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which have been detailed as the agreement with the proprietors and patrons of the Mount Elgin cheese factory. At Woodstock the patrons of the factory kept a smaller number of cows each than the farmers in the other case. For that reason, and in order to obtain the information which a comparison between the centrifugal separator plan and the cream-gathering plan would afford, it was decided to collect the cream only at this factory. The company agreed to put the making-room into such repair that it could be occupied during the winter. The main expenses were the sheeting around the outside of the building on the posts between the sills and the ground, and the putting on of double windows and storm doors. It was estimated that the outlay required would be between $100 and $125. I agreed to pay $100 for rent of the premises, to put in the necessary apparatus and equipment for the manufacture of butter, and to collect the cream and manufacture the butter at a charge of 4 cents per lb. of butter. The factory making-room was sufficiently large to permit all the butter-making machinery and utensils to be placed in one end of it. As in the case of the factory upon the centrifugal separator plan, a list of the apparatus and utensils required to fit up a cheese factory for the manufacture of butter upon the cream-gathering plan is given herewith. The price which is placed opposite to most of the articles is the price which was charged to the Government. A private concern could not purchase them at quite as low prices, but, on the whole, the cost of making the alterations and putting in all requisite apparatus and fittings need not exceed the amount which is stated.

| | |
|---|---|
| 2 Cream vats (200 gallons each) | $ 80 00 |
| 1 Revolving churn (250 gallon size) | 41 00 |
| 1 Power butter-worker | 55 00 |
| 1 Hand do | 9 00 |
| 1 Pair butter scales | 8 50 |
| 6 Thirty-gallon refrigerator cream-collecting cans | 57 00 |
| 1 Four-gallon cream-fermenting can | 6 00 |
| 3 Cream gatherer's measuring pails | 6 00 |
| 1 Large dipper, 1 small dipper, 1 strainer dipper, &c. | 5 00 |
| 2 Butter spades, 2 butter ladles, 1 butter packer, &c. | 2 00 |
| 1 Butter printer (lettered) | 5 00 |
| 1 Butter trier | 4 00 |
| 1 Strainer for cream, 1 hair sieve | 3 00 |
| 1 Oil-test churn with cream collectors' cases | 43 00 |
| 1 Butter-milk tank | 6 00 |
| 1 Stove | 10 00 |
| Stencil plates | 3 00 |
| Carpenter-work, shafting, pulleys, belting, hangers, pipes, fittings, freight and teaming | 175 00 |
| | $518 50 |

The milk was set by the farmers in deep-setting pails in tanks of cold water. They were at liberty to skim the cream from the milk at any time. The cream gatheror called at every patron's place every second day. The full quantity of cream for the creamery was measured in a cylindrical pail 12 inches in diameter.

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The number of inches in depth was credited to each patron. After the cream was thoroughly mixed a sample was taken in a glass tube for the oil-test churn, which revealed the quality of the cream or the number of ounces of butter which it would yield per inch. The cream was paid for according to the quantity of butter which it yielded.

The following paragraphs taken from Dairy Bulletin No. 3 explain the nature and use of the oil-test churn :—

*Qualities of Cream.*

Since managers of creameries have adopted the plan of paying for cream according to its butter-making qualities, some dissatisfaction has been caused among the patrons by the differences which comparisons have made evident. In most cases the trouble arises from an erroneous idea that the richest cream is the best for butter-making and the most profitable to the patron. It is not the patron who supplies the cream which yields the greatest number of ounces of butter per inch who always obtains the largest returns from the milk which has been set. Milk which has been set in deep pails at a high temperature, and has not been cooled below 60° Fahr., will yield a cream very rich in butter-making quality; but there will be a smaller quantity of cream obtained from the milk and a less quantity of butter than where the milk is cooled as low as 40° Fahr. The longer the time cream stands on milk after practically all of it has come to the top, the less space it will occupy. As it shrinks in bulk it becomes richer per inch, but the total quantity of cream from the milk will not yield any more butter than it would have made before it became compact by long standing. (A creamery inch of cream is equal to 113 cubic inches, or to 1 inch in depth of a cylindrical vessel 12 inches in diameter.) When the milk is skimmed every 12 hours the cream will not yield as many ounces of butter per inch as when it has been set for 24 hours or longer.

Skimming should not be delayed longer than 24 hours after the milk is set. Cream should be removed from the milk before it is sour. Its value to a creamery for butter-making depends not alone upon its richness in butter-fat; purity, sweetness and fine flavour are qualities it should possess.

*The Oil-Test Churn.*

The oil-test churn is used to determine the quantity of churnable fat in each supply of every patron's cream. The requirements for its successful use are :—

(*a*). Careful sampling of the cream, which should be poured at least twice from one vessel to another before the sample is taken for the test tubes;

(*b*). Accurate measuring;

(*c*). Souring of the cream;—(to ensure a uniform degree of acidity in all the samples of cream, they should be warmed to 70° Fahr. and kept at that temperature for 24 hours before they are churned);

(*d*). Heating of the samples to a temperature of 135° Fahr. after they have been churned;

(*e*). Subsequent cooling to 65° or 70° Fahr.;

(*f*). Churning, reheating and cooling.

In a case where the butter-oil of any sample does not separate to show a clear line of demarcation between itself and the other constituents of the cream, the cooling to 70°, the churning and reheating should be repeated.

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The first butter was made in the creamery on 21st November, 1891.

Further particulars of its fitting up and operation will be found in the report of Mr. J. A. Ruddick.

During the month of March, 1892, a number of the patrons expressed a desire that a centrifugal separator should be put into the creamery. It was fitted up and put into operation on 26th March. From then until 23rd April, thirty-six of the patrons

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supplied milk, instead of cream. The additional apparatus required were: 1 centrifugal cream separator, 1 Babcock milk-tester: 1 ejector for elevating skim-milk, 1 skim-milk tank, and shafting, pulleys, hangers and belting.

The following is a summary of the business:—

The creamery commenced operations on 21st November, 1891, and cheese-making was resumed after 23rd April, 1892.

Forty patrons supplied cream.

Eighteen of the same patrons, and eighteen others, supplied milk after 26th March.

| | |
|---|---|
| The quantity of butter manufactured from gathered cream was | 9,111 lb. |
| The quantity of butter manufactured from milk received was | 2,524 do |
| Total | 11,635 do |

The quantity of milk received was 68,221 lb.

The average percentage of fat contained in the milk was 3·34.

The milk from different patrons varied from 2·93 per cent to 4 per cent of fat.

The average number of pounds of milk required to yield a pound of butter from 26th March to 23rd April was 27·2 lb. Every pound of butter-fat in the milk yielded 1·1 lb. of marketable butter.

Shipments of butter were made to Liverpool and Toronto. Full account sales from the shipments to Liverpool have not yet been received. Part of the lot of the first shipment, which was made wholly from gathered cream, sold for 108s. per cwt. or 15s. per cwt. lower than the butter from the centrifugal separator creamery at Mount Elgin. This difference in price was largely owing to the fact that the gathered cream was raised under unfavourable conditions at many of the farms; on the other hand, the cream from the centrifugal separator was under the control and care of a skilled butter-maker from the commencement. Some particulars on the relative quantities of butter which may be obtained from the two methods may be found at pages 57–58. The butter which was sent to Toronto was put up in 1-lb. prints. It fetched 25 to 23 cents per lb. at Woodstock station. The following brief report of the closing meeting of the patrons is taken from one of the newspapers:—

"The Dominion Experimental Creamery closed its operations on Saturday. A meeting of the patrons was held at the factory last night, President West in the chair. Mr. J. A. Ruddick, manager of the creamery, gave a brief summary of the work done. The total number of pounds of butter made was 11,643, during a season of five months, a much greater quantity than was expected when the creamery was started. The net figures as to the result and profit obtained are not yet to hand, but it is expected that the patrons will receive over 20 cents per pound clear of all expenses. The Woodstock creamery was started on the cream gathering plan, but by the 26th of March the business had increased so much that it was found necessary to introduce a centrifugal cream separator. The result showed that from 15 to 25 per cent more butter could be made by the use of the separator than by the old cream-raising method. The milk was tested by the Babcock tester, and each patron credited with the number of pounds of butter-fat delivered daily. The justice of this method will be easily recognized by the dairymen when it is known that the per cent of butter-fat in the different milks varied from 2·93 to 4 per cent. A number of the patrons gave expression of opinion as to the result of the Government experiment here.

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Mr. Blow, who has sent milk to Toronto on former winters, said that he considered that he had done much better this year by patronizing the creamery, provided they realize about 20 cents per pound for the butter, as is expected. He was highly satisfied with the results.

Mr. E. Rinch considered he had made double as much out of his cows as he would have done if he had made his own butter.

Mr. John Kirkpatrick said it paid him better than selling milk in Woodstock at $1.

Mr. M. S. Schell, who feeds a large number of cattle, said that he believed that in order to make money out of a farm one had to do it by feeding stock to produce either beef or milk, and with butter at 20 cents per pound he considered the production of milk would pay better.

Mr. Werry declared that if there was no more butter made in the winter at this factory he would have to sell his cows, as his wife says she will make no more.

The speakers all laid great stress on the value of the skimmed milk for feeding purposes. It was returned to them sweet. On motion it was unanimously decided that the factory be operated as a creamery again next winter.

The following resolution was also carried unanimously:—Moved by Mr. Jos. Blow, seconded by Mr. J. W. Chambers, "That we, the patrons of the East and West Oxford Experimental Creamery, established by Prof. Robertson, Dairy Commissioner of the Department of Agriculture, Ottawa, and under the immediate direction of Mr. J. A. Ruddick, desire to give expression to our hearty appreciation of the efforts so put forth to introduce and foster winter butter-making under the creamery system; and further, that we are satisfied from our experience of the past winter that by the introduction of winter butter-making a much larger return from our cows will be realized than has heretofore been obtained."

### SUMMARY OF REPORTS OF MY ASSISTANTS.

The reports of the superintendents of experimental dairy work contain much reliable information and advice for the guidance of cheese-makers, butter-makers and dairymen. Besides containing a record of the work which was taken up by them, they are full of helpful suggestions. A brief summary of their contents may be given as follows:—

### *Mr. T. J. Dillon's Report (Ontario).*

1. In some experimental work at Salford factory, in the cooking of curd to temperatures between 84° and 87°, the body of the cheese was found defective from being too soft. Mr. Dillon thinks that fault might have been remedied by the addition of more salt to the curd.

2. He visited 40 cheese factories, and in the testing of milk found the quality of the milk furnished by the different patrons to vary from 5 per cent to 1·6 per cent of fat. He addressed 12 meetings in connection with these visits to cheese factories. In his reports on the condition of the factories he states that he found fifteen factories clean and tidy, eighteen of them in a passable condition, and seven of them very dirty. He points out that the example of cheese-makers is often copied by the patrons, and advises cheese-makers to make the surroundings of the factory buildings, whey tanks, &c., models of cleanliness and neatness. He cites a case where he helped to scrub out a whey tank which had not been cleaned before for seven years. He mentions instances where the cheese hoops had not been cleaned for many years.

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3. He points out that the farmers should exercise more care in the keeping of milk perfectly clean, as that condition is essential to the making of fine wholesome cheese and butter.

4. The defects in the cheese which he examined were mainly the presence of too much lactic acid, dryness of body, ragged holes throughout the texture, and a general want of finish from careless or inferior workmanship.

5. In connection with the running of the experimental dairy station at Mount Elgin, he points out that the common opinion among the patrons was, that the profit derived from the feeding of the skim-milk has been sufficient to pay for the extra feed consumed by the cows to keep them milking during the winter. The cows are reported to be in better condition than if fed sparingly and allowed to go dry.

6. As an illustration of the value of the services which have been rendered, two instances are cited of factories where twenty-two cheese (weighing an average of sixty-six pounds each) were being made per day, and where one full cheese extra was made per day at each factory from the same quantity of milk after his visit. A great deal of advantage accrued to the makers of cheese also from being able to get through the day's work earlier by adopting his suggestions.

*Mr. J. A. Ruddick's Report (Ontario).*

1. Mr. Ruddick visited 22 cheese factories and held 16 meetings. As many as 10 cheese-makers on one day came to visit the factories at which he gave instructions in the course of his travels. During the travelling which was undertaken, before the work of experimental investigation in cheese-making was commenced, he met 69 cheese-makers, 4 dairy inspectors, 8 cheese buyers, 23 factory managers and about 500 patrons of cheese factories. He noticed a marked improvement in the cheese and cheese-makers.

2. He urges more attention to cleanliness of the buildings and utensils, and advocates the use of water that is hot and not merely lukewarm. He found a number of thermometers in use which were as much as 4 or 5 degrees in error.

3. He classifies the cheese-makers into three groups: (*a*) those who are always trying to improve; (*b*) those who are anxious to get cheese to pass, regardless of their quality; and (*c*) those who are utterly shiftless and lazy. He does not entertain much hope for the latter class; (neither do I for them, either here or hereafter).

4. He points out mistakes which he observed in cheese-making:—(*a*) he found milk ripened too much; (*b*) he found in many cases that the salting and the putting of the curd to press was done before the curd was ripe enough for those treatments; (*c*) he found cheese-makers using too small a quantity of rennet extract at all seasons of the year.

5. He tested 640 samples of milk with the Babcock milk-tester. The richest sample he found was one containing 4·4 per cent of fat, and the lowest one containing 2·6 per cent of fat. The average quality of the milk was 3·44 per cent of fat. Seven samples tested over 4 per cent of fat and 14 samples less than 3 per cent of fat. A statement of some of the experimental work in cheese-making, which was undertaken at the Perth factory, is also given.

6. Reference is made to what was done at the working dairies at the Sherbrooke and Montreal exhibitions.

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7. A brief report is made upon the working of the winter creamery at Woodstock until the 31st of December. He mentions that in no case was the cream frozen on its way to the creamery. The patrons were hardly prepared to engage extensively in winter dairying, but they are satisfied with the results, and speak with confidence of their intention to support and run the creamery during next winter.

SUMMARY OF THE WORK IN QUEBEC.

Besides the work which was undertaken in this province by Mr. J. C. Chapais, a concise and interesting summary of which is given in his annual report, partial superintendence and assistance were given at the Dominion Dairy Show, held at Sherbrooke, Quebec, on 1st to 5th September, 1891. At this exhibition there were gathered in competition cheese from Quebec, Ontario, British Columbia and Nova Scotia. I was assisted in the judging of the cheese by Andrew Clement, Esq., Glasgow, Scotland, one of the largest and most experienced importers of cheese into the Scottish markets, and D. M. Macpherson, Esq., of Lancaster, Ont. The quality of the cheese was generally excellent. In my opinion, which was concurred in by the two gentlemen whom I have named, the quality of the cheese on the whole was the finest ever examined at any exhibition held in Canada. The display of butter included packages from British Columbia. The creamery butter from the Province of Quebec was exceptionally fine. The exhibition brought to light in a more prominent way than could otherwise be done the great advancement made in dairy practices and in the improvement of dairy products in Quebec during recent years. The friendly rivalry which exists between the sister provinces for holding the first place in the Dominion in the reputation of their products will tend to the advantage of dairymen in them all.

A working dairy formed part of the dairy outfit at Sherbrooke. Three of my assistants, Messrs. Ruddick, Macdonald and Hart, performed the work and gave illustrations and information to all who visited that department of the exhibition. We also conducted a working dairy at the exhibition in Montreal. While these working dairies at exhibitions are popular and interesting features, which help to attract the public and increase the gate receipts of the exhibition companies, I do not consider that any further expense connected with them should be borne by our department. In so far as they direct public attention to the best methods of conducting dairy operations, they have an educational value. However, at exhibitions in most instances, they are visited mainly by a class of people whose interest in dairy work is superficial and casual. Viewed in the sense that they are simply an attractive department of an exhibition, it seems to me that hereafter the exhibition promoters or companies should provide these, as they do other special attractions, from their own funds. At Sherbrooke we conducted tests in the competitions between the cattle of the breeds entered in the different classes. We did that also at Toronto, in connection with the prize of silver plate offered by *The Farmer's Advocate*, of London, Ont. This matter also in future years should, I think, be left to the exhibition managers, exhibitors and others who may offer prizes.

Experimental work in cheese-making was carried on at Dunham, Que. Shipments of these cheese were made to Great Britain. With regular and larger shipments of products from our Experimental Dairy Stations in coming years, it is to be

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expected that a still wider interest will be evoked from the public in Great Britain, not only in the excellent quality of our food products, but in the opportunities and facilities which this country offers for settlement by English farmers who are able and willing to carry on mixed and dairy farming.

*Report of Mr. J. C. Chapais, Assistant Dairy Commissioner (Quebec).*

1. Mr. Chapais gives statistical particulars of the meetings which he addressed. He made 54 visits in 34 counties at which he (1) gave lectures on agriculture and dairying and (2) helped to organize syndicates of cheese factories and creameries for the engagement of competent inspectors and instructors.

In company with Mr. C. C. Macdonald (one of my expert cheese and butter-makers) he visited 33 localities in 28 counties. At these places practical demonstrations in the arts of making cheese and butter were given, and lectures were delivered to the patrons of the factories on the care and feeding of dairy stock, the handling and preparation of milk for delivery to factories and the benefits from co-operative dairying. At the meetings which were held in connection with these visits 6,000 farmers, 142 cheese-makers, 26 butter-makers and 8 inspectors of syndicates received instructions.

2. Mr. Chapais gives a synopsis of two lectures which he delivered in many of the localities. The first lecture is a clear exposition of the relation of the dairy industry to improvement in agriculture in Quebec. The second lecture was given to promote the formation of syndicates of cheese factories and creameries. Both lectures are full of such instruction and advice as must be beneficial to the dairy interests of Quebec.

3. A report of the methods of procedure at the cheese factories and creameries which were visited is given. The faults in the buildings of the factories, and their surroundings, are pointed out, and remedies are suggested. The unsuitable practices in the handling of milk and the methods of manufacturing its products are mentioned, and the treatments whereby the best quality of products may be obtained are indicated.

4. Comments are offered on the Dominion dairy show at Sherbrooke, Que.; and the rapid and gratifying progress which is being made towards improving the quality of the dairy products of Quebec is stated.

*Mr. C. C. Macdonald's Report (Quebec).*

1. Mr. Macdonald describes his work of travelling instruction by which he visited counties, mostly in the French-speaking districts, giving instruction in cheese-making, butter-making and the use of the Babcock milk-tester. He gave instructions to 152 cheese-makers and 14 butter-makers. He was well received everywhere, and travelled nearly 4,000 miles.

2. He points out that many of the cheese factories are imperfectly constructed, rather poorly equipped and without sufficient drainage. The practice of engaging "cheap" cheese-makers is deplored, as inexperienced men offer to work for low wages, and bring loss and trouble to the factory owners and patrons. Mention is made of the fact that where he found women managing factories, they were kept in a tidy and clean state.

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3. He points out that inferior rennet of bad flavour and odour is sometimes used with necessarily injurious results to the quality of the cheese. Cheese boxes are often badly nailed, and finished very roughly. A cheese box should have at least 45 nails, to enable it to successfully stand the handling to which it will be submitted.

4. He noticed considerable improvement in cheese-making since 1890. Forty-four meetings were attended, and no meetings were held while hay-making was in progress.

5. He points out that in marketing cheese, many are shipped too green, entailing a loss upon both factorymen and buyers.

6. He reports the butter factories to be better built and better kept, as a rule, than the cheese factories.

7. He tested 1,226 samples of milk, and found the quality to range from 3·5 per cent to 8 per cent of butter-fat. He found one fine cow at St. Jérôme, Lake St. John district, giving 15 pounds per milking, which tested 8 per cent of fat.

8. He points out that the cows are often badly cared for during the winter, which prevents them from milking as well as they otherwise would during the summer. Valuable milch cows are obtained in a cross between the Quebec Jerseys and the Ayrshires. The Lake St. John region is particularly mentioned for its fine nutritious grasses and pure water in streams and lakes. The crops of wheat, oats, pease, barley, flax, corn, and hay, which were observed there, are favourably commented upon. He claims that 50 head of cattle can be kept on 100 acres of land in the Lake St. John district.

9. Farmers and cheese-makers were all evidently anxious to learn and to profit by the opportunities offered to them by the travelling instructors and experimental dairy stations.

10. The cup or rennet test for the ripeness of milk is described and recommended to cheese-makers.

### SUMMARY OF THE WORK IN NEW BRUNSWICK.

In New Brunswick, besides the work which was effected through meetings which I attended in that province during the summer, and that reported upon by Mr. John Robertson and Mr. S. L. Peters, the foundation was laid for very thorough and useful service in that province hereafter. The Provincial Parliament has appropriated $10,000 for the advancement and improvement of dairying in New Brunswick. At a conference with the members of the Provincial Government, to which I was invited, I was able to outline certain plans for work, which are being given effect to in that province with gratifying success. Local dairymen's associations are being formed in many of the agricultural divisions of the province. Three organizers have been employed by the Provincial Government, to hold meetings, give addresses, distribute samples of Indian corn, and assist in the organization of local dairymen's associations. Two travelling dairies are about to begin work under my direction and control, and the Provincial Government have arranged and agreed to pay the expenses which are incurred, up to $1,500. A provincial dairymen's association has been formed recently, by the enlargement of the name and objects of the Provincial Farmers' Association of New Brunswick, and its incorporation under the name of "The Provincial Farmers' and Dairymen's Association of New Brunswick." On the whole the prospects for a rapid enlargement and improvement in the dairy-



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ing practices of this province are bright indeed. The cheese which were shipped from New Brunswick in the autumn of 1891 were sold in the English market at 56s. per cwt. (112 lb.). This was the same as the highest price realized for cheese sent from the Experimental Dairy Stations in Ontario. Cheese from New Brunswick can be made to meet the requirements of the British market quite as satisfactorily as cheese from any of the other provinces of the Dominion. The extension of butter-making during the winter will also lead to a considerable export of that article after the needs of the local markets are supplied.

*Mr. John Robertson's Report (New Brunswick).*

1. Carleton County has gone most into dairying, and Westmoreland County most into beef raising. Both are naturally adapted for dairy farming.

2. New Brunswick now imports largely of dairy produce; she should provide quantities for export.

3. Cattle are nearly all mixed as to breeding. Ayrshires or their grades are most plentiful. A few Jerseys were noticed, and Holsteins have been introduced into the province lately.

4. Many districts in New Brunswick are admirably adapted for sheep husbandry.

5. Particulars of dairying are given as follows:—Carleton County has one cheese factory and one butter factory; 250 samples of milk were tested, of which the poorest contained 2·5 per cent of fat, and the richest 4·5 per cent. The average quality was 3·69 per cent of fat.

6. The cheese factories were visited a second time, when a considerable improvement in the quality of the cheese was observed. Five lots of cheese for export were made, and were ultimately shipped to the British market.

7. Fourteen meetings were addressed, and the average attendance was about 150.

*Mr. S. L. Peters' Report (New Brunswick).*

Mr. Peters commenced work late in the autumn. His report mentions that his efforts to improve the quality of the butter in the places which he visited, were very much appreciated. The old-fashioned dash churn, involving more arduous labour, has given place to the revolving or swing churn. Many inquiries have been made about the growing of corn and the construction of silos. Twenty-one meetings were held, nearly all in December; and the total attendance reached 980. Mr. Peters has done the travelling mainly with his own horse and buggy.

SUMMARY OF THE WORK IN NOVA SCOTIA.

In Nova Scotia our work was confined mainly to those parts of the province where cheese factories had been established. The report of Mr. Wheaton outlines very fully what was undertaken in this province during the year. I have attended the annual conventions of the Nova Scotia Dairymen's Association for the last three years. The meetings are increasing in interest and practical utility to the people who attend. An annual report of the proceedings of the convention is issued by the secretary of the association, Mr. Paul C. Black, Falmouth, N.S.

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The cheese which were shipped by me from Nova Scotia, went at the same time as the cheese from the sister province of New Brunswick. The Nova Scotia cheese were made in the factory of Mr. L. C. Archibald, at Antigonish. They also sold for 56 shillings per cwt. (112 lb.) and were reported upon very favourably by the men in the trade in England who examined them.

The distribution of sample bags of Indian corn for fodder uses has awakened an interest in this crop.

The following circular which was sent with the sample bags of corn contained a few simple directions:—

DEPARTMENT OF AGRICULTURE,
OFFICE OF THE DAIRY COMMISSIONER, OTTAWA, 1891.

DEAR SIR,—A further development of the dairy business and cattle feeding in connection therewith, will be of immediate and lasting benefit to the Maritime Provinces, if it be undertaken prudently. In order that a larger number of cattle may be kept with profit, it is very desirable that such crops should be grown as will enable farmers to feed them in the cheapest possible way during the winter. For the purpose of introducing and encouraging the practice of growing Indian corn for fodder, provision has been made by the Government, upon the recommendation of the Minister of Agriculture, whereby I am enabled to furnish a small sample bag of Indian corn suitable for that purpose, to every patron of a cheese factory or creamery in these provinces.

### PLANTING.

Corn should be planted as early as possible in June.

Land that has been manured and prepared for a crop of roots will be suitable; or a piece of a sod field may be ploughed, manured with rotted manure and planted with corn.

The corn should be planted in rows, 3 feet apart; a shallow furrow may be made with a marker or a plough; the seed should be dropped into it at the rate of from 4 to 6 grains per foot; it should then be covered and the soil pressed firmly over it.

During the summer it should be kept free from weeds by the use of a hoe or a cultivator.

### CUTTING AND CURING.

The crop should be cut in the autumn before there is any risk of frost which would damage it to some extent, if it came before the cutting was completed. The corn may be cut with a sickle or a reaping-hook.

Where it is not fed green, it should be tied up in large stooks in the field or yard.

For winter feeding it should be carried to the stable direct from the stooks, or it may be stored loosely with the stalks standing on end in a shed, barn or loft. The stalks should never be laid on their sides in large bulk, or they will heat and mould. If barn or shed room be not available, the corn may be left to stand in stooks, or in long rows tied against both sides of a central pole which may be supported on forked sticks.

Full particulars on the growth of fodder corn in large quantities, and the feeding of the same will be furnished free upon application to the Central Experimental Farm, Ottawa.

I am your obedient servant,
JAS. W. ROBERTSON,
*Dairy Commissioner.*



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Many farmers report that they are preparing to plant from two to five acres each. This will enable them to find an economical method for the wintering of their cattle in better condition than in past years. The succulent feed, which will be available, either from the cured fodder corn, or from ensilage, will make it possible to develop winter dairying in this province also in the near future. From the better feeding of cows during the winter, which the fodder corn will make possible, a larger flow of milk during the summer may be expected, than when dry fodder only was fed while the cattle were in stable quarters. The work in Nova Scotia during the year 1892, should be prosecuted by a travelling instructor visiting the different cheese factories, in order to render the makers such assistance as they need. Meetings of the patrons can be held at each factory, to give them information on the care of milk and its preparation for cheese-making. A few individuals who have erected factories in Nova Scotia, are to be congratulated upon the neatness and convenience with which most of the buildings have been finished.

*Mr. J. W. Wheaton's Report (Nova Scotia).*

1. Mr. Wheaton visited 20 cheese factories and made 716 tests of milk. Nineteen meetings were held with an average attendance of about 25. Particular interest was manifested in the subject of growing fodder corn. The price realized by the farmers for their milk was from 70 to 75 cents per hundred pounds. The quantity of cheese made in some of the factories in 1891 was less than in former years. That was due to the lapsing of agreements to furnish milk by patrons living at some distance from the factories, who objected to the loss of time occasioned by drawing their own milk. Provision must be made for the collecting of the milk to the factories from the milk-stands of the several farmers. Six factories are controlled by joint stock companies, the others are operated by private individuals.

2. The natural conditions of the valleys of Nova Scotia for dairy farming are pointed out. There is an abundance of fine grass and plenty of water. The nights are cool, which favours the providing of a fine quality of milk. The greatest objection to a successful development of dairying, is from the long period of stable feeding which is required. That is stated as varying from 7 to 8 months.

3. The small-sized cattle are shipped to Newfoundland. The farmers have been prejudiced against growing corn, because of the fear that great expense would be involved in the preserving of it.

4. In cheese factories, the curing-rooms were not kept as clean or tidy as they should have been. Of the samples of milk which were tested, those taken from the vats in cheese factories ranged from 2·9 to 3·8 per cent of fat or an average of 3·32 per cent. A few samples from the milk of individual patrons showed from 4 to 4·5 per cent of fat. One sample indicated as high as 5·3 per cent.

5. One hundred cheese were made for export to the British markets from milk containing from 3·4 to 3·5 per cent of fat.

6. The proposal to start a winter butter-making station in Nova Scotia is thought to be premature, as the farmers are not yet ready with succulent feed for winter or with cows coming in at that season of the year.

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SUMMARY OF THE WORK IN PRINCE EDWARD ISLAND.

In this Island province a promise has been made to the farmers that an Experimental Dairy Station will be established in the summer of 1892. Milk from 350 cows has been promised in its support in the neighbourhood of New Perth. The distribution of sample bags of corn has created a great interest in this matter and many farmers who before last year had never grown any corn for cattle-feeding are promising to plant from 2 to 4 acres. The outlook for an enlargement of dairying in the Island is very satisfactory. The natural resources of the Island are such that 25 cheese factories, in which cheese might be made during the summer and butter during the winter, could be in successful operation.

*Mr. John Robertson's Report (Prince Edward Island).*

1. The fine and fertile appearance of the Island is commented upon and described. The crops of spring wheat were good and spoken of as being better than those of former years. Oats are mentioned as being a good crop, although considerable loss is sustained by the farmers from imperfect cleaning of the grain. The growth of fodder corn is recommended, instead of potatoes, as being more profitable. Hay does well in most districts on the Island.

2. The cattle are mostly Shorthorns and Ayrshires, or their grades. There are a few herds of good Holsteins and their grades. Failures in dairy work in the past have not been due to unfavourable natural conditions. There was only one cheese factory in operation on the Island in 1891. Of the milk which was tested, the sample showing the highest percentage of butter-fat contained 4·25 per cent. The sample showing the lowest percentage of butter-fat contained 3·50 per cent. Twelve meetings were held.

SUMMARY OF THE WORK IN MANITOBA AND THE NORTH-WEST TERRITORIES.

A meeting of the Manitoba Dairymen's Association was held on the occasion of my visit to Brandon in July, 1891. After the close of this convention, a Provincial Farmers' Institute was organized. Two travelling dairies, under the charge of Messrs. McEwan and Whitley, commenced their work in July. In the reports of these gentlemen, particulars will be found of the work which was undertaken. The following circular which was issued states the character of the work which was undertaken by these travelling dairies:—

DOMINION OF CANADA,
DAIRY COMMISSIONER'S OFFICE,
OTTAWA, July, 1891.

DEAR SIR,—I have been directed by the Honourable the Minister of Agriculture to take such steps, for the dissemination of information on the best practices in dairying, as will promote an improvement in the quality of the butter and cheese which are made in all the provinces of Canada.

In Manitoba and the North-West Territories, dairying can be followed with profit and satisfactory success in many districts. The soil, the pasturage, the fodder crops, and the climatic conditions, are all favourable for the production of the finest quality of milk, butter, cheese and beef. By a system of mixed farming, the farmers may fortify themselves against disastrous loss from the very serious risk which is incurred by any individual or community, that depends exclusively upon one crop or upon grain-selling alone.

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For the purpose of giving practical instruction and an illustration of the best methods of making cheese and butter, one of my assistants, Mr..... ..... will visit..... .....on..... ..... ..... .....

It is desirable that a meeting of the farmers should be called for that date. If you will be good enough to distribute the bills which have been sent to you, and also make any necessary arrangements for securing a SCHOOL HOUSE or HALL, as a place of meeting, I will esteem it a favour to myself and also to the community amongst whom you reside. If quite convenient, please secure one or two gallons of cream for the occasion, to be used in giving a practical lesson in butter-making.

I am, Sir, your obedient servant,

JAS. W. ROBERTSON,

*Dairy Commissioner.*

*Mr. J. B. McEwan's Report.*

1. Mr. McEwan spent the time between May 17th and June 5th, in the Belleville district, visiting cheese factories. He visited 9 factories, giving the first day in each case to milk-testing and cheese-making and the second day to milk-testing and a meeting of the patrons. The subjects presented at these meetings were, winter dairying, lessening the cost of production, fodder corn for ensilage, breeding of dairy stock, Babcock milk tester, and the payment for milk according to its fat contents. He speaks of the Madoc district as being particularly well adapted for the extension and development of dairying.

2. Cheese factories he found to be in rather a poor condition as to buildings. Curing rooms were specially faulty in construction, little provision being made for maintaining an equable temperature. He recommends more confidential exchange of opinion between the cheese-makers and salesmen. With an absence of this, sometimes cheese which are made to cure rapidly, are held until they lose their flavour, and sometimes cheese which are made to cure slowly, are sold before they are fit for shipment. The quality of the milk examined ranged from 2·6 per cent of fat to 3·6 per cent, with an average in all factories of 3·4 per cent. He recommends the use of milk aërators. The tendency to reduce the salaries of cheese-makers is having the effect of keeping good men from going into the business.

3. Mr. McEwan went to Manitoba in July. He visited 15 cheese factories, 7 creameries and held 20 meetings in Manitoba and the North-West Territories.

4. He spent two weeks at the cheese factory at Manitou, manufacturing cheese for shipment to the Central Dairy Station. He spent one week at the Winnipeg Exhibition and acted as judge of dairy products there. He reports the quality of the butter as most excellent. Much interest was taken in all the meetings and in the instruction which was given at the cheese factories. The most interest was manifested in those districts where Farmers' Institutes have been established. General notes on the appearance of the country, its cattle, pasturage and water, have been made. Of the creameries which were visited, 5 are operated upon the centrifugal cream separator plan and 2 upon the cream gathering plan. The prices realized to the patrons from the sale of butter, varied from 65 cents to 80 cents per hundred pounds of milk. The pounds of milk required per pound of butter ranged from 24 pounds in the spring to 18 pounds in October. The butter is sold mainly in Manitoba and British Columbia at prices from 18 to 25 cents per pound.

5. Inspectors of butter have been appointed at Virden, Grenfell and Wolseley. The butter is sorted into three grades and sold at differences of from 2 to 3 cents

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per pound per grade. Some buyers do not purchase the butter until after it has been inspected by the official inspector. The quality of the milk found in individual cases varied from 2 per cent of fat to 4·6 per cent. The quality of the milk from the milk-vats in factories varied from 3·75 per cent to 4.2 per cent of fat. The average number of pounds of milk required to yield one pound of cheese ranged from 9·12 to 9·34 pounds. The price last season averaged 10½ cents per pound of cheese. There are different modes of payment for the milk delivered. In one case 25 per cent of the gross receipts from sales go to the manufacturer. In another 2½ cents per pound of cheese manufactured is the charge. At another factory the milk is purchased at 70 cents per hundred pounds.

*Mr. C. F. Whitley's Report.*

Mr. Whitley rendered some help at the dairy station on the Central Experimental Farm, prior to his leaving for Manitoba. In Manitoba he attended 20 meetings. In all about 730 persons attended the meetings. He, as well as Mr. McEwan, was equipped with a kit for the making of butter, and gave illustrations of butter-making from the platforms at the meetings which were held. He furnished a list of about 700 names of those who desired to receive dairy bulletins hereafter. He points out that the tendency in Manitoba is more towards mixed farming and dairying than it has been in past years. Three creameries on the Manitoba and North-Western Railway are referred to. At one of them the cream-collecting waggon travels 30 miles. But little convenient accommodation for dairying has been provided at the farm houses, and discrimination by the storekeepers in the prices which have been paid for different qualities has not been very marked. He recommends furnishing to each storekeeper, slips giving brief points on butter-making, to send out with their tubs. General notes on the grasses, cattle and natural resources of Manitoba have been given. The success of a few men is specified and it is thus pointed out that others may succeed equally well along similar lines.

SUMMARY OF THE WORK IN BRITISH COLUMBIA.

In British Columbia I was able to address nine meetings. A side journey was made from Sicamous into the Okanagon Valley. A new railway was under course of construction, and a hand steam car was in use on the track as far as Enderby, which is some twenty-five miles distant from Sicamous. Between Enderby and Vernon the valley is of irregular widths, with many arms reaching back between and behind the adjacent hills. At few places is the width greater than from two to three miles, and at many places it is not more than one mile wide. It offers excellent facilities for mixed and dairy farming, although the latter branch of agriculture has not received much attention in past years. The other places in British Columbia, which I visited, were Agassiz, Chilliwack, Langley, Town Hall at Maple Ridge, Ladner's Landing, New Westminster, Victoria and Vancouver. I addressed meetings at each of these places. In my addresses delivered in other parts of Canada since my return from British Columbia, I have enlarged at some length upon the natural resources and opportunities which British Columbia offers for dairy farming and settlement by a class of agriculturists, who can take some capital to the province with them. On both sides of the Fraser River, the valley land is very fertile. I saw crops of hay which would yield more than three tons per acre, and crops of oats which would give 100 bushels to the acre. Some farmers have as many

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as from forty to fifty cows each. Small fruits and large fruits grow in luxuriant abundance, and fruit canning factories are being started at several places.

MEETINGS AND LECTURES.

Besides the work which has been reported upon in the several provinces, I attended and delivered addresses at forty-nine conventions or meetings of farmers and dairymen of from two to five sessions each during 1891. They were distributed in the provinces in the following order: Ontario, 19; Quebec, 8; New Brunswick, 2; Nova Scotia, 4; Prince Edward Island, 3; Manitoba, 3; North-West Territories, 1; British Columbia, 9. My assistants also attended and gave addresses upon 242 occasions, most of which are mentioned in their reports in this volume. During 1892, to this date (30th April) I have attended fourteen meetings of farmers and dairymen, most of which have been conventions of provincial nature and scope. Of these, 8 were held in Ontario, 2 in Quebec, 1 in New Brunswick, 1 in Nova Scotia and 2 in Prince Edward Island. The number of applications for my presence at conventions of farmers has outgrown all possibility of compliance on my part with one-quarter of them. The Order in Council by which I was appointed Dairy Commissioner, sets forth the fact that the main object and sphere of my work was the diffusing of practical information among the farmers of the Dominion, by means of bulletins, conferences and lectures. Other duties which have grown up in connection with experimental investigations at the Central Experimental Farm and the establishment of Branch Experimental Dairy Stations, have curtailed the time which is available for public meetings. These new branches of work are not less important to the dairy and agricultural interests of Canada than the delivery of lectures. In fact, they furnish the subject matter, which is most useful for presentation to the farmers and dairymen. The particulars from these investigations which relate to the feeding of cattle, the fattening of swine, experiments in the dairy, the growth of forage crops and the making of ensilage, have been reported upon in my capacity as Agriculturist to the Central Experimental Farm. They are also presented under the first five parts of this report, which are mentioned hereafter. I have considered it to be in the interests of the farmers and dairymen, that the substance of some of the lectures which were delivered upon different occasions, should be brought to the attention of many of them, whom the voice of one speaker cannot hope to reach. I have been furnished with stenographic reports by the several organizations before whose members they were delivered, and I have revised them from the notes from which I spoke at these gatherings.

For the sake of clearness, convenience of reference and the service of those who may consult its pages for guidance in their own practices, the further matter of this report is arranged under the following heads:—

Part I.—Cattle.

Part II.—Swine.

Part III.—Experimental Dairy.

Part IV.—Forty Acre Lot.

Part V.—Fodder Corn and the Silos.

Part VI.—Lectures and Addresses.

Part VII.—Condensed Milk.

Part VIII.—Report of the Assistant Dairy Commissioner, Mr. J. C. Chapais, St. Denis, Que.

Part IX.—Reports of Superintendents of Experimental Dairying.

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The volume of trade from Canada in the exports of butter and cheese is shown by the following tables:—

DOMINION OF CANADA—Exports of Dairy Products—Home Production.

BUTTER.

| Year. | Quantity. | Value. | To Great Britain. | To United States. | To France. | To Germany. | Other Foreign Countries. | B.N.A. Provinces. | British Indies. |
|---|---|---|---|---|---|---|---|---|---|
| | Lb. | $ | $ | $ | $ | $ | $ | $ | $ |
| 1868.... | 10,649,733 | 1,698,042 | 544,707 | 1,015,702 | .. ..... | 1,496 | 14,870 | 95,777 | 26,986 |
| 1880.... | 18,535,362 | 3,058,069 | 2,756,064 | 111,158 | ..... .. | ... .... | 24,710 | 163,290 | 2,847 |
| 1881.... | 17,649,491 | 3,573,034 | 3,333,419 | 58,522 | ..... | . ..... | 30,574 | 143,935 | 6,584 |
| 1882.... | 15,161,839 | 2,936,150 | 2,195,127 | 529,169 | ..... | .... ... | 32,052 | 169,270 | 10,538 |
| 1883.... | 8,106,447 | 1,705,817 | 1,330,585 | 206,154 | ..... | ..... | 29,446 | 131,341 | 8,291 |
| 1884.... | 8,075,537 | 1,612,481 | 1,395,652 | 46,618 | ..... | ..... | 16,455 | 151,224 | 2,532 |
| 1885.... | 7,330,788 | 1,430,905 | 1,212,768 | 16,795 | ..... | 15,172 | 21,473 | 161,862 | 2,835 |
| 1886.... | 4,668,741 | 832,355 | 652,863 | 17,545 | ..... | ..... | 17,577 | 142,485 | 1,885 |
| 1887.... | 5,485,509 | 979,126 | 757,261 | 17,207 | ..... | ..... | 23,789 | 180,238 | 631 |
| 1888.... | 4,415,381 | 798,673 | 614,214 | 13,468 | ..... | .. . .... | 5,226 | 164,329 | 1,436 |
| 1889.... | 1,780,765 | 331,958 | 174,027 | 7,879 | ..... | ..... | 22,921 | 124,349 | 2,782 |
| 1890.. | 1,951,585 | 340,131 | 184,105 | 5,059 | ..... .. | ..... | 29,342 | 119,989 | 1,636 |
| 1891.... | 3,768,101 | 602,175 | 440,060 | 10,054 | .. ..... | 20,447 | 24,021 | 101,649 | 5,944 |

CHEESE.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1868.... | 6,141,570 | 620,543 | 548,574 | 68,784 | .... . | ..... | 891 | 1,954 | 340 |
| 1880.... | 40,368,678 | 3,893,366 | 3,772,769 | 114,507 | ..... | ..... | 170 | 5,710 | 210 |
| 1881.... | 49,255,523 | 5,510,443 | 5,471,362 | 28,500 | . . .. | ..... | 14 | 10,027 | 540 |
| 1882... | 50,807,049 | 5,500,868 | 5,471,676 | 18,436 | .. .. | ..... | 242 | 8,196 | 2,318 |
| 1883.... | 58,041,387 | 6,451,870 | 6,409,859 | 24,468 | ..... . | ..... | 202 | 15,480 | 1,863 |
| 1884.... | 69,755,423 | 7,251,989 | 7,207,425 | 24,866 | . .. | . .... . | 188 | 19,248 | 262 |
| 1885.... | 79,655,367 | 8,265,240 | 8,178,953 | 68,978 | ..... | ..... | 205 | 15,899 | 1,207 |
| 1886.... | 78,112,927 | 6,754,626 | 6,729,134 | 15,478 | 80 | 90 | 156 | 9,139 | 549 |
| 1887.... | 73,604,448 | 7,108,978 | 7,065,983 | 30,667 | . ... .. | ..... | 211 | 11,982 | 165 |
| 1888.... | 84,173,267 | 8,928,242 | 8,834,997 | 83,153 | 5 | ..... | 828 | 9,087 | 172 |
| 1889.... | 88,534,887 | 8,915,684 | 8,871,205 | 31,473 | ..... | ..... | 1,582 | 11,208 | 216 |
| 1890.... | 94,260,187 | 9,372,212 | 9,349,731 | 6,425 | ..... | 370 | 2,154 | 12,777 | 755 |
| 1891.... | 106,202,140 | 9,508,800 | 9,481,373 | 13,485 | ..... | .. ..... | 1,954 | 9 104 | 2,884 |

The following table, from the Board of Trade returns of Great Britain for six years (ended 31st December), shows the total quantities and values of butter and cheese imported into Great Britain and illustrates the possible extension of our exports, particularly in fresh-made butter during the winter season.

| BUTTER. | | | CHEESE. | | |
|---|---|---|---|---|---|
| Year. | Quantity. | Value. | Year. | Quantity. | Value. |
| | Cwts. | £ | | Cwts. | £ |
| 1886.... .. ..... | 1,543,566 | 8,141,438 | 1886.. .... ..... | 1,734,890 | 3,871,359 |
| 1887..... .. ..... | 1,513,134 | 8,010,374 | 1887... ..... .... | 1,836,789 | 4,514,382 |
| 1888..... ..... | 1,671,433 | 8,913,045 | 1888.. .. ..... | 1,917,616 | 4,546,408 |
| 1889..... .... .. .. | 1,927,842 | 10,244,636 | 1889... .... ..... | 1,907,999 | 4,490,970 |
| 1890. ..... | 2,027,717 | 10,598,848 | 1890.. . ..... ..... | 2,144,074 | 4,975,134 |
| 1891..... | 2,135,607 | 11,591,181 | 1891... ..... | 2,041,317 | 4,815,369 |

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ACKNOWLEDGMENTS.

To the newspapers of Canada is due much credit for the public-spirited assistance which they have given in attracting the attention of farmers to the possible benefits which would accrue to themselves and all other industrial, commercial and professional interests from the adoption of the best methods of dairy farming. In our work the press has lent us invaluable aid; towards our work its attitude has been friendly to a fault; and of our work columns of appreciative commendation have appeared for every iota of unfriendly criticism or opposition.

To the officers and members of the Farmers' and Dairymen's Associations, to the officers and members of the Farmers' Institutes, and to thousands of the sturdy, hard-working, warm-hearted farmers of Canada from the shores of the Pacific to the Atlantic coast, I am under a sense of deep personal and official obligation for the many courtesies which they have extended, for the ready and hearty co-operation which they have accorded, and for the all-too-generous gratitude with which they have received and acknowledged the service which we have been able to render.

The thoroughness and successful outcome of some of the work which has been undertaken, depends in a large measure upon the faithfulness and efficiency of my assistants whose names are not often brought to public notice to receive the due recognition and appreciation which the value of their labours merits. I take this opportunity of acknowledging the excellent quality of their work and of commending a careful perusal of their reports.

I have the honour to be, Sir,

Your obedient servant,

JAS. W. ROBERTSON,

*Dairy Commissioner.*

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## PART I.—CATTLE.

To the herd of cattle, only a few thorough-bred animals were added by purchase during the year. They were almost immediately thereafter shipped to the branch experimental farm at Brandon, Man.

### *Shorthorn.*

From Mr. W. S. Hawkshaw, Glanworth, Ont.:

One bull calf, General H.—14574—; red; calved 15th December, 1890; bred by W. S. Hawkshaw, Glanworth, Ont.; got by Aberdeen Hero (Imp.)—; dam, Countess of Hawkhurst—8752—; by 3rd Duke of Rutland—559—; Countess 2nd—784—; by Lord Ramsden—794—.

### *Holsteins.*

From Messrs. A. C. Hallman & Co., New Dundee, Ont.:

One cow, Queen of Waterloo, No. 14666, H.F.H.B., No. 163, H.F.H.B.C.; calved 12th April, 1888; bred by A. C. Hallman & Co., New Dundee, Ont.; sire, African Prince, No. 1270, H. F. H. B.; dam, Mina Rooker 2nd, No. 3742, H.F.H.B.

One cow, Princess Leda 2nd, No. 18510, H.F.H.B., No. 141, H.F.H.B.C.; calved 6th January, 1889; bred by A.C. Hallman & Co., New Dundee, Ont.; sire, Netherland Monk, No. 4424, H.H.B.; dam, Princess Leda, No. 7130, H.F.H.B.

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*Ayrshires.*

From Messrs. Kains Bros., Byron, Ont.

One bull, Middlesex—1216—; red and white; calved 10th September, 1890; bred by Kains Bros., Byron, Ont.; sire, Prince of Byron—583—; dam, Jeanie of Auchenbrain, (Imp.)—129—; by Duke 3rd—647—; Paisley, by Wallace of Drumlanrig —61—. From Messrs. David Morton & Sons, Hamilton, Ont.

One heifer, Dandy 2nd (imported in dam)—2004—; brown and white; calved 6th April, 1889; bred by Hugh Jack (Little Shewalton), Irvine, Scotland, imported by David Morton & Sons, Hamilton, Ont.; sire, Dandy Jim (1579); dam, Dandy 1st (5502), by Red Prince (1000).

One heifer, Jewel—2003—; white and brown; calved 14th June, 1889; bred by Hugh Jack (Little Shewalton), Irvine, Scotland; imported by David Morton & Sons, Hamilton, Ont.; Sire, Dandy Jim (1579); dam, Judy (Imp.) (5505); by Red Prince (1000).

*Galloways.*

We exchanged a bull calf which we had received in 1890 from Mr. Thomas McCrae, Guelph, Ont., for one bull, Chester (4472) 6760; calved March, 1887; bred by D. McCrae, Guelph, Ont.; sire, Stanley III of Drumlanrig (Imp.) (1793) 2833; dam, Chrissy (Imp.) (7099) 2587; by Chipperkyle (2332).

The four animals of the Galloway breed, which we had at the Central Experimental Farm, were sent to the Brandon farm, together with four Shorthorns and one young Holstein bull.

*Grade Steers.*

In October, 1891, sixteen grade steers were purchased for the carrying on of investigations into the effects of different rations for the feeding and fattening of cattle.

GENERAL MANAGEMENT.

SUMMER.—The hours of the stablemen were from 6 a.m. to 6 p.m., and four hands were employed. The assistant from the experimental dairy fed the calves. The bulls, part of the cows and the calves, were kept in the stables and fed on green fodders. The area of pasture land has been small for the number of cattle which have been kept. The animals not in the stables were inspected, and fed allowances of green fodder every day during the greater part of the season. The same hands looked after the experimental piggery and fed from 20 to 40 pigs.

WINTER.—The hours of the stablemen are from 6 a.m. to 5 p.m., and six hands are employed. Experiments in feeding are in progress, with 25 cows, 21 steers and 36 swine. Nine different rations are fed daily to cows, steers, bulls and calves. The quantity of feed consumed daily, by each animal, or group of animals, is weighed and recorded. The stalls and gutters in the main stable are cleaned out twice daily; the box stalls are cleaned out every second day. The cattle are curried daily, with a few exceptions; and the udders of the milking cows are brushed carefully before each milking. All the breeding and other animals—which are not weighed oftener in some special test—are weighed once every month.

*Abortions.*

During 1890 the disease of epidemic abortion was reported as prevailing in the herd. The method of treatment, which was then adopted, was described:—

I. The stables were thoroughly fumigated by the burning of sulphur, saturated with alcohol, with the doors and windows closed for three hours. Of course, all the cattle were out.

II. A wash was made up of 1 part of bichloride of mercury to 4,000 parts of water, into which solution were put 8 ounces of common salt; once a day the bare skin around the vulva, the anus and the root of the tail of the cows in calf, and also of those which had aborted, were sponged with the solution.

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III. After several weeks of that treatment, the following was adopted as being preferable: 2½ drachms of bichloride of mercury were dissolved in 3¼ ounces of glycerine and 3¼ ounces of alcohol; after these had united, 4¼ gallons of rain water were added. (The mixture should be kept in a wooden vessel, out of the reach of irresponsible persons, and animals). The bare skin under the tail and around that part was moistened once a day with the solution.

IV. The cows, which formerly had been turned out into a large yard every day for water, were watered from troughs in front of their stalls.

V. When a pregnant cow showed any sysmptoms of approaching abortion—and these are, slight relaxation of the muscles surrounding the vulva, restlessness and a continuous slight elevation of the tail—she was at once put into a box stall, where she was free from disturbance or causes of excitement. One-ounce doses of tincture of opium were given in the feed—even three times a day for one or two days until a quiet and slightly sluggish condition prevailed. Drenching with medicine was avoided.

The result is—and it is mentioned with hesitation and fear, lest the dread abortions should occur again—that since the system of treatment has been adopted 13 cows have given safe delivery to calves at the natural time, and only one case of abortion has occurred, and that could be accounted for satisfactorily. That covers a period of three and a half months. During the preceding ten months there were 13 births at the natural time, and 14 prematurely, at from four and a-half to eight months.

The preceding six paragraphs have been copied from my report of 1890. During 1891 the number of births at the natural time was 34. There were 3 cases of abortion; one of these was that of a cow which had a similar misfortune last season; another of the cases could be accounted for afterwards, in so far as it was discovered that the cow was affected with an incurable disease, which had a tendency to provoke uterine disorders; the third case was that of a grade heifer, and for it no satisfactory reason could be assigned. There were also two cases of still-born calves.

### *Lice on Cattle.*

Government property has no greater immunity from the attacks of parasites than that of private individuals, and during the winter of 1890-91 some of the cattle became infested with lice. That fact is mentioned for the purpose of stating that a most effective, safe and simple treatment can be given by applying a kerosene emulsion. The method of preparation is described thus in Bulletin No. 11, prepared by Mr. Fletcher, Entomologist:—

| | |
|---|---|
| Kerosene (coal oil) | 2 gallons |
| Rain water | 1 do |
| Soap | ½ pound |

"Boil the soap in the water till all is dissolved; then, while boiling hot, turn it into the kerosene, and churn it constantly and forcibly with a syringe or force pump for five minutes, when it will be of a smooth, creamy nature. If the emulsion be perfect it will adhere to the surface of glass without oiliness. As it cools it thickens into a jelly-like mass. This gives the stock emulsion."

For use on the cattle it was diluted with 18 times its measure of water. Besides killing the lice, it seemed to have a beneficial action on the hair and skin. One-quarter of the quantity mentioned above is sufficient for a large herd.

### *Dehorning.*

On 3rd December the operation of dehorning was performed on 4 three-year old steers, and on one Jersey bull five years old.

Through questions which have been asked at conventions and farmers' institutes, and by letters which have been received, an opinion has been asked repeatedly during the past two years upon the subject of dehorning cattle. Farmers who have sufficient open-shed or closed-in-shed convenience for the fattening of steers if they could be allowed to run loose with safety, have made frequent applications for information. The practice has become common in many of the States of the Union.

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The references which have been made to it in the columns of the agricultural press provoked further curiosity and interest on the part of Canadian farmers, to learn from some authoritative source in Canada what effect the operation would have. The mode of procedure was to put each steer into the sling which we use for lifting the bulls when the hoofs are to be trimmed. The neck was fastened securely between two upright pieces of scantling, one of which was movable at the top, after the style of the common old-fashioned stable stanchion. The head was then tied to one side. The hair around the base of each horn was clipped off, to permit the cutting to be effected in such a way as to remove a narrow ring of skin with the horn. Leavitt's dehorning machine was used on two horns. It is constructed in such a way as to clip the horn off at one snap. In the case of three-year-old steers, the horns were too hard and tough for one man to use the machine with sufficient quickness of motion. For the other horns, a common fine-toothed carpenter's saw was used.

The operation on each horn lasted from one quarter to one half of a minute. In the case of two of the steers, the saw cut through an artery, from which a small jet of blood spurted. The wounds on the heads of two of the steers, appeared to be acutely painful for nearly a week; the other two animals did not appear to suffer any inconvenience after the operation was ended. It was not expected that blood would flow so freely from the wounds as it did in the two cases mentioned, and no particular preparation had been made to staunch the flow at once. A cloth covered with coal-tar, is probably one of the most accessible and suitable applications which can be made on the ordinary farm. The steers have been fed in box stalls, running loose in pairs, and they seem to be most healthy and gentle since the wounds healed.

In the case of the Jersey bull, he had become so vicious that the attendants went into his box-stall only at the jeopardy of their lives. Instructions had been given several months previously that no one was to go into his box-stall until after he had been securely tied. For the dehorning operation, the bull was tied in a similar manner to the steers. His horns were sawn off as close to the skull as possible. Not a thimbleful of blood altogether was shed; and when he was turned loose in his box-stall he acted as mildly as a sheep.

A full report on the feeding of the dehorned steers will appear after the completion of the experiment, which is expected to last until after April, 1892.

### The Feeding of Six Steers.

Six steers were purchased for feeding purposes in November, 1890. They were a fairly even lot of two-year-olds, and apparently were grades of Shorthorns. On 1st December, 1890, the average weight was 1,135 lb. each. They were weighed every week, and all the feed which they consumed was weighed every day. They had free access to water in a trough in front of the stalls, and a supply of salt was provided at one side of each manger. The following Table shows the weight of each steer on 1st December, 1890, and every four weeks thereafter until 18th May, 1891.

| — | Dec. 1. | Dec. 29. | Jan. 26. | Feb. 23. | Mar. 23. | April 20. | May 18. | Total Gain |
|---|---|---|---|---|---|---|---|---|
| Steer No. 1 | 1,220 | 1,305 | 1,355 | 1,390 | 1,420 | 1,486 | 1,493 | 273 |
| " No. 2 | 1,120 | 1,195 | 1,200 | 1,256 | 1,255 | 1,350 | 1,374 | 254 |
| " No. 3 | 1,037 | 1,096 | 1,102 | 1,188 | 1,199 | 1,235 | 1,317 | 280 |
| " No. 4 | 1,170 | 1,230 | 1,263 | 1,310 | 1,336 | 1,385 | 1,442 | 272 |
| " No. 5 | 1,225 | 1,302 | 1,308 | 1,361 | 1,386 | 1,396 | 1,430 | 205 |
| " No. 6 | 1,040 | 1,081 | 1,108 | 1,175 | 1,207 | 1,257 | 1,263 | 223 |

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# REPORT OF THE AGRICULTURIST.

(Jas. W. Robertson.)

To Wm. Saunders, Esq.,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to report upon the progress of the work which has been under my charge at the Central Experimental Farm during 1891. The duties of my office, as Dairy Commissioner for the Dominion, engrossed the major share of my attention, and occupied the most of my time during the year. Attendance at conventions of farmers and dairymen—many of them of provincial nature and scope—in the several provinces of Canada, took me from home very frequently.

Upon the recommendation of the Honourable the Minister of Agriculture, the Government approved of the establishment of Experimental Dairy Stations, (1) for the purpose of investigating, by carefully conducted and repeated experiments, the methods and treatments in the manufacture of cheese during the summer, which yield the finest quality and the greatest quantity of cheese from the milk which is furnished by the patrons of factories, and (2) for the purpose of carrying on the manufacture of creamery butter at the same stations, during the other months of the year, in order to encourage farmers to obtain an income from their cows during every month, by supplying cream or milk to a creamery and by the raising of calves and pigs during the winter season. Parliament made provision for that undertaking in the appropriation for the work of the Dairy Commissioner. From March, 1891, preparatory arrangements in the different provinces were made. Supervision was given to the work of itinerant instructors in the provinces, where the dairy industry was not developed sufficiently to call for the establishment of Experimental Dairy Stations in 1891; and the management of two Experimental Dairy Stations in Ontario, and some experimental work in Quebec, were undertaken.

These tasks and duties, together with lectures at conventions of dairymen and farmers' institutes, required my absence from Ottawa for some part of every month, and for the greater part of all the months, except February and November. In all, 49 conventions or meetings, of from two to five sessions each, were attended during the year. They were distributed: Ontario, 19; Quebec, 8; New Brunswick, 2; Nova Scotia, 4; Prince Edward Island, 3; Manitoba, 3; North-West Territories, 1; British Columbia, 9. My assistants in the Dairy Commissioner's branch of the work attended and gave addresses at 242 meetings. The report of the Dairy Commissioner for 1891 (which can be obtained upon application by farmers and all others who are interested in agriculture), will present a brief yet fairly complete statement of progress.

The remainder of my time was available for the Central Experimental Farm, and was given to planning for and superintending experiments in (1) the feeding of steers for beef; (2) the economical feeding of milking cows; (3) the fattening of swine; (4) investigations in the experimental dairy; (5) the management of 40 acres of land, to determine how many cattle could be kept economically on that area; and (6) the growth of fodder corn and the making and feeding of ensilage.

Permit me to refer farmers, and others who may be seeking information on the other branches of the agricultural work—grain-growing, root-growing and general farm management—to your own report.

For the sake of clearness, and the convenience of those who may be seeking information and guidance from its pages, the matter to be presented has been grouped under the following heads:—

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For a period of five weeks, from 17th March to 20th April, one pound each of oil-cake and cotton-seed meal were added to the ration.

For the whole period of 20 weeks, from 29th December to 18th May, each steer consumed an average of 52·8 lb. per day.

For the purpose of making a comparison between the actual cost of feeding steers on the three different rations, a market value was estimated for the component fodders in each. The hay was valued at $8 per ton; roots (turnips or mangels) at $4 per ton; straw at $4 per ton; pease and barley at $20 per ton; and cotton-seed meal and oil-cake at $30 per ton. The corn ensilage cost $1.40 per ton, as per statement in Bulletin No. 12, issued by Prof. Saunders in June, 1891. It will be observed that the corn ensilage was placed at cost, and the other fodders at an estimated market price; but it will not be considered by farmers, in many districts in Canada, that they can produce hay at a cost below $8 per ton, or roots below $4 per ton.

The following Table shows (1) the increase in weight of the steers in 20 weeks; (2) the quantity of feed consumed per day, and (3) the cost per head per day for feed:—

TABLE II.

| — | Ration. | Increase in Weight. | Average feed consumed per day. | Average cost of feed per day. |
|---|---|---|---|---|
| | | Lb. | Lb. | Cents. |
| First lot.. No. 1 | Hay, roots and meal | 188 | 55·5 | 19·23 |
| First lot.. No. 2 | do do | 179 | | |
| Second lot No. 3 | Corn ensilage and meal | 221 | 60· | 11·90 |
| Second lot No. 4 | do do | 212 | | |
| Third lot No. 5 | Hay, roots, corn ensilage and meal. | 128 | 52·8 | 15·58 |
| Third lot No. 6 | do do do | 182 | | |

All the steers were allowed as much feed as they could eat up clean; and the quantity was varied from time to time, as they would eat more or less.

It may be mentioned, in explanation of the small increase in weight of steer No. 5, that he did not thrive well, part of the time. That could not be accounted for satisfactorily. He seemed to be healthy, but, as everyone who has fed cattle knows, an animal "will go off his feed" occasionally and will not thrive.

It will be observed that the steers fed on the corn ensilage and meal ration gained an average of 33 lb. each more than those on the ration of hay, roots and meal, during the 20 weeks.

During the last month of the testing period steers No. 3 and 4, on corn ensilage and meal, gained in weight much faster than the others; and when the experiment was finished they were in more attractive condition for handling and selling.

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Table III shows the quantities of the digestible constituents in the feed, consumed by the several lot of steers, as calculated from the following table, which is reproduced from the report of 1890 :—

QUANTITIES of Digestible Protein, Carbo-hydrates and Fat, in each pound of certain Feeds, from tests with ruminants—(Oxen and Cows.)

| —— | Total Dry Organic Matter. | Digestible Protein. | Digestible Carbo-hydrates. | Digestible Fat. |
|---|---|---|---|---|
| | Lb. | Lb. | Lb. | Lb. |
| Wheat ..... 1 lb. | ·89 | ·095 | ·588 | ·014 |
| Barley ..... do | ·89 | ·094 | ·600 | ·026 |
| Oats ..... do | ·87 | ·080 | ·440 | ·044 |
| Pease ..... do | ·87 | ·201 | ·534 | ·029 |
| Oil-cake ..... do | ·92 | ·283 | ·368 | ·050 |
| Cotton-seed meal ..... do | ·92 | ·336 | ·264 | ·070 |
| Wheat bran ..... do | ·87 | ·117 | ·453 | ·027 |
| Mixed straw (wheat, barley, oat) ..... do | ·85 | ·035 | ·330 | ·004 |
| Mixed hay ..... do | ·86 | ·051 | ·430 | ·012 |
| Corn ensilage ..... do | ·25 | ·016 | ·230 | ·006 |
| Corn stover ..... do | ·48 | ·033 | ·480 | ·008 |
| Turnips ..... do | ·085 | ·010 | ·075 | ·001 |
| Mangels ..... do | ·120 | .011 | ·100 | ·001 |
| Carrots ..... do | ·141 | .013 | ·115 | ·002 |
| Sugar beets ..... do | ·185 | .010 | ·167 | ·001 |

TABLE III, showing the average quantities consumed, per day, by the two Steers in each lot.

| —— | Rations. | Total Dry Organic Matter. | Digestible Protein. | Digestible Carbo-hydrates. | Digestible Fat. |
|---|---|---|---|---|---|
| | | Lb. | Lb. | Lb. | Lb. |
| First lot, steer No. 1.. | Hay, roots and meal .... | 47·64 | 4·60 | 25·34 | ·87 |
| do No. 2.. | | | | | |
| Second lot, steer No. 3. | Corn ensilage and meal.... | 44·04 | 4·55 | 31·65 | 1·13 |
| do No. 4. | | | | | |
| Third lot, steer No. 5.. | Hay, roots, corn ensilage and meal..... | 43·62 | 4·41 | 25·98 | ·93 |
| do No. 6.. | | | | | |

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## Experiments in Progress.

At the present time, experiments are in progress with twenty steers :

Three-year-olds.—Two steers which were dehorned are being fed in a loose box (where the temperature is almost as low as in a shed with single board sides) on a ration of—

| | Lb. |
|---|---|
| Corn ensilage | 50 |
| Straw | 5 |
| | 55 |

Two steers of the same age and similar quality, also dehorned, are being fed in a like manner, on a ration of—

| | Lb. |
|---|---|
| Corn ensilage | 50 |
| Straw | 5 |
| Oil-cake | 2 |
| Ground pease | 2 |
| do barley | 2 |
| | 61 |

Two-year-olds.—Two steers are being fed upon each of the following rations:

| No. 1. | Lb. | No. 2. | Lb. | No. 3. | Lb. | No. 4. | Lb. |
|---|---|---|---|---|---|---|---|
| Corn ensilage | 20 | | | Corn ensilage | 50 | Corn ensilage | 50 |
| Hay | 10 | Hay | 20 | | | | |
| Roots | 20 | Roots | 40 | | | | |
| Straw | 5 | Straw | 5 | Straw | 5 | Straw | 5 |
| Oil-cake | 2 | Oil-cake | 2 | Oil-cake | 2 | Frozen wheat | 6 |
| Ground pease | 2 | Ground pease | 2 | Ground pease | 2 | | |
| do barley | 2 | do barley | 2 | do barley | 2 | | |
| | 61 | | 71 | | 61 | | 61 |

Yearlings.—Two yearling steers are being fed in a loose box, similar to those used for the three-year olds, on ration No. 3; and two other steers of equal age are being fed on the same ration in the ordinary stable.

Calves.—Two steer calves—one Shorthorn grade and one Quebec Jersey grade —are being fed on ration No. 2; and two steers of an equal age, and similar breeding, are being fed on ration No. 3.

These experiments will furnish data, also, upon the number of pounds gained in weight, and the quantity of feed consumed per pound of increase in live weight, by *three-year-old*, *two-year-old*, *yearling* and *calf* steers, respectively, when fed upon the same ration.



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### The Feeding of Milking Cows.

The object of this test was to discover the effect of substituting corn ensilage for hay and roots, and also the effect of substituting hay and roots for corn ensilage in the ration of milking cows. A study was also made of the economic effect of feeding different quantities of ground grain and meal in the rations. Eighteen milking cows were selected. For one week they were all fed upon a ration composed of—

| | Lb. |
|---|---|
| Corn ensilage | 25 |
| Roots (carrots, mangels) | 20 |
| Straw (oat and barley) | 10 |
| Bran | 3 |
| Meal (pease, barley, oats) | 2 |
| Cotton-seed meal | 2 |
| | 62 |

Each animal was allowed as much of the mixture as it would eat every day. Twelve of the cows (afterwards Lots 1, 2, 3 and 4) were fed twice a day; and six of the cows (afterwards Lots 5 and 6) were fed three times daily. The eighteen cows were divided into three groups of six cows each. The six cows of each group were again divided into two lots of three cows each. The cows in each lot were arranged in such a way that the cows in the one lot of each group, were of nearly equal weights, milking capacity and period of lactation, with the cows of the other lot in the same group. For the first four weeks of the experiment eight tests of the morning and eight tests of the evening milk of each cow, were made with the Babcock milk tester, to determine the percentage of fat. Only four tests of the morning milk and four tests of the evening milk of each cow, were made during the second feeding period, after which the testing apparatus was unexpectedly required for the work of the travelling dairy instructors. The tests, which had been made, twice of morning milk and twice of evening milk, of each cow, every week, had shown such wide variations and unaccountable fluctuations in the quality of the milk of the same cows that it was decided that the data on the percentage of fat in the milk could not be considered reliable unless the milk were tested every day.

A series of experiments to discover the effect of the quality of the feed upon the percentage of the solid constituents in the milk of 25 cows has been undertaken since, and will be reported upon when it is concluded. At the time of writing, enough information has been secured to warrant the statement that a progressive increase in the richness of the ration, by the addition of one pound of meal per cow per day, every fortnight, does not appear to have any appreciable effect towards increasing the percentage of solids in the milk, within three months.

The Cows of Group I., Lot 1 (Daisy, Pinkie, Blossom) were grade Shorthorns, and at the commencement of the test—23rd March, 1891—had been milking for an average period of 46 days. The average weight of the cows was 1,195 lb. each.

*First Period.*

From 23rd March to 19th April the three cows of Group 1, Lot 1, were fed on ration 1, which was composed as follows:—

| | Lb. |
|---|---|
| Corn ensilage | 60 |
| Wheat bran | 2 |
| Chopped pease | 2 |
| Oil-cake | 2 |
| Cotton-seed meal | 2 |
| | 68 |

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Of that mixture each cow consumed an average of 92·7 lb. per day. The 92·7 lb. of the mixture contained 10·9 lb. of the mixture of bran, chopped pease, oil-cake and cotton-seed meal. The cost per day was calculated on the same basis of valuation as was used in the tests in the feeding of steers, viz.:—hay at $8 per ton; roots at $4 per ton; wheat, bran, pease and barley at $20 per ton; and cotton-seed meal and oil-cake at $30 per ton. Corn ensilage cost $1.40 per ton, as per statement in Bulletin No. 12, issued by Prof. Saunders in June, 1891. Upon that scale of values, the cost per day was 19·37 cents per cow for feed.

The average quantity of milk, which had been yielded by the three cows during the weeks which preceded this test—1st March to 22nd March—was 28·3 lb. each per day. From 23rd March to 19th April the average quantity of milk was 28·94 lb. per cow per day.

The average quality of the milk, as determined by eight tests of morning milk and eight tests of evening milk of each cow, showed 3·52 per cent of fat.

The animals weighed an average of 1,195 lb. each at the commencement, and an average of 1,207 lb. each at the end of the four weeks.

*Second Period.*

After the feeding of the ration 1, for four weeks, the quantity of corn ensilage was increased to 90 lb., with the same quantity of meal as before. The ration as then arranged was:—

| | Lb. |
|---|---|
| Corn ensilage | 90 |
| Wheat bran | 2 |
| Chopped pease | 2 |
| Oil-cake | 2 |
| Cotton-seed meal | 2 |
| | 98 |

Of that mixture each cow consumed an average of 95 lb. per day, which contained 7·7 lb. of the meal mixture—bran, chopped pease, oil-cake and cotton-seed meal.

The cost per day was 15·77 cents per cow, or 3·6 cents per cow less than in the former case.

The average quantity of milk was 26 lb. per cow per day.

The animals weighed an average of 1,200 lb. each at the end of the four weeks.

*Third Period.*

During the third period of fou weeks the ration was:—

| | Lb. |
|---|---|
| Corn ensilage | 40 |
| Hay | 20 |
| Bran | 2 |
| Chopped pease | 2 |
| Oil-cake | 2 |
| Cotton-seed meal | 2 |
| | 68 |

Of that mixture each cow consumed an average of 53·6 lb. per day, which contained 6·3 lb. of the meal mixture—bran, chopped pease, oil-cake and cotton-seed meal.

The cost per day was 16·4 cents per cow.

The average quantity of milk was 21·7 lb. per cow per day.

The animals weighed an average of 1,234 lb. each at the end of the four weeks



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The extended explanations which have been given in presenting the facts of feeding the cows of Lot 1, for the three periods of four weeks each, apply to the other lots of cows.

The following Tables present the facts for convenient comparisons:—

TABLE I.—Group I, Lot 1, (Daisy, Pinkie, Blossom).—Three grade Shorthorn cows. At 23rd March, when the first period of the test began, the average length of time from the commencement of their milking period was 46 days.

| Composition of Ration. | Preparatory Period of one week. | First Period of four weeks. | Second Period of four weeks. | Third Period of four weeks. |
|---|---|---|---|---|
| Corn ensilage. ..... Lb. | ..... | 60 | 90 | 40 |
| Hay..... " | ..... | ..... | ..... | 20 |
| Root (mangels or carrots)..... " | ..... | ..... | ..... | ..... |
| Meal (equal parts by weight of wheat bran, ground pease, oil-cake and cotton-seed meal).. " | ..... | 8 | 8 | 8 |
| | ..... | 68 | 98 | 68 |
| (For composition of ration for preparatory period, see page 72). | | | | |
| Quantity consumed per cow, per day..... Lb. | 57· | 92·7 | 95· | 53·6 |
| do of meal, per cow, per day..... " | ..... | 10·9 | 7·7 | 6·3 |
| Value of feed consumed, per cow, per day.. ...Cents. | ..... | 19·37 | 15·77 | 16·40 |
| Average quantity of milk, per cow, per day.... Lb. | 28·3 | 28·94 | 26·06 | 21·74 |
| do percentage of fat in milk..... p.c. | ..... | 3·52 | ..... | ..... |
| do live weight per cow at beginning .. .. Lb. | 1,175 | 1,195 | 1,207 | 1,200 |
| do do do end..... " | 1,195 | 1,207 | 1,200 | 1,234 |
| Value of feed consumed per 100 lb. of milk produced.....Cents. | ..... | 66·93 | 60·51 | 75·43 |

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TABLE II.—Group I, Lot 2 (Blue-Bell, Buttercup, Pansy).—Three grade Shorthorn cows. At 23rd March, when the first period of the test began, the average length of time from the commencement of their milking period was 45 days.

| Composition of Ration. | | Preparatory Period of one week. | First Period of four weeks. | Second Period of four weeks. | Third Period of four weeks. |
|---|---|---|---|---|---|
| Corn ensilage | Lb. | ..... | 30 | 40 | 90 |
| Hay | " | ..... | 15 | 20 | ..... |
| Roots (mangels or carrots) | " | ..... | ..... | ..... | ..... |
| Meal (equal parts by weight of wheat, bran, ground pease, oil-cake and cotton-seed meal.) | " | ..... | 8 | 8 | 8 |
| | | | 53 | 68 | 98 |
| (For composition of ration for preparatory period, see page 72.) | | | | | |
| Quantity consumed per cow, per day | " | 57 | 68 | 53 | 90 |
| do meal per cow, per day | " | ..... | 10·2 | 6·2 | 7·3 |
| Value of feed consumed per cow, per day | Cents. | ..... | 23·19 | 16·22 | 14·94 |
| Average quantity of milk per cow, per day | " | 26·8 | 28·47 | 27·1 | 23·87 |
| do percentage of fat in milk | p.c. | ..... | 3·50 | ..... | ..... |
| do live weight per cow at beginning | Lb. | 1,211 | 1,214 | 1,247 | 1,250 |
| do do end | " | 1,214 | 1,247 | 1,250 | 1,249 |
| Value of feed consumed per 100 lb. of milk produced | Cents. | ..... | 81·45 | 59·85 | 62·58 |

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TABLE III.—Group II, Lot 3 (Barberry, Clenna Rex, Countess).—Two Jersey and one Ayrshire cows. At 23rd March, when the first period of the test began, the average length of time from the commencement of their milking period was 151 days.

| Composition of Ration. | | Preparatory Period of one week. | First Period of four weeks. | Second Period of four weeks. | Third Period of four weeks. |
|---|---|---|---|---|---|
| Corn ensilage | Lb. | | 60 | 90 | 90 |
| Hay | " | | | | |
| Roots (mangels or carrots) | " | | | | |
| Meal (equal parts by weight of wheat bran, ground pease, oil-cake and cotton-seed meal) | " | | | 4 | 8 |
| | | | 60 | 94 | 98 |
| (For composition of ration for preparatory period, see page 72.) | | | | | |
| Quantity consumed per cow, per day | " | 44· | 60· | 66·3 | 93· |
| do of meal per cow, per day | " | | | 2·9 | 5·3 |
| Value of feed consumed per cow, per day | Cents. | | 4·2 | 7·95 | 10·79 |
| Average quantity of milk per cow, per day | Lb. | 13·9 | 10·75 | 11·32 | 12·58 |
| do percentage of fat in milk | p.c. | | 4·65 | | |
| do live weight per cow at beginning | Lb. | 856 | 854 | 827 | 812 |
| do do end | " | 854 | 827 | 812 | 856 |
| Value of feed consumed for 100 lb. of milk produced | Cents. | | 39·06 | 70·22 | 85·77 |

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TABLE IV.—Group II, Lot 4 (Maggie B., Clenna Rex II).—One Ayrshire and one Jersey cow. (The other Jersey cow was taken sick and was dropped out.) At 23rd March, when the first period of the test began, the average length of time from the commencement of their milking period was 172 days.

| Composition of Ration. | | Preparatory Period of one week. | First Period of four weeks. | Second Period of four weeks. | Third Period of four weeks. |
|---|---|---|---|---|---|
| Corn ensilage | Lb. | ..... | 60 | 90 | 90 |
| Hay | " | ..... | ..... | ..... | ..... |
| Roots (mangels or carrots) | " | ..... | ..... | ..... | ..... |
| Meal (equal parts by weight of wheat bran, ground pease, oil-cake and cotton-seed meal) | " | ..... | 8 | 8 | 4 |
| | | ..... | 68 | 98 | 94 |
| (For composition of ration for preparatory period, see page 72.) | | | | | |
| Quantity consumed per cow, per day | " | 47 | 74·5 | 70·8 | 66·7 |
| do of meal per cow, per day | " | ..... | 8·7 | 5·7 | 2·8 |
| Value of feed consumed per cow, per day | Cents. | ..... | 15·57 | 11·75 | 8 |
| Average quantity of milk per cow, per day | Lb. | 17·6 | 18·18 | 18·49 | 14·12 |
| do percentage of fat in milk | p.c. | ..... | 4·58 | ..... | ..... |
| do live weight per cow at beginning | Lb. | 846 | 833 | 869 | 881 |
| do do at end | " | 833 | 869 | 881 | 898 |
| Value of feed consumed per 100 lb. of milk produced | Cents. | ..... | 85·64 | 63·54 | 56·62 |

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TABLE V.—Group III, Lot 5 (Dorinda II, Dorinda III, Aaggie's Cornelia). Three Holstein cows. At 23rd March, when the first period of the test began, the average length of time from the commencement of their milking period, was 150 days.

| Composition of Ration. | | Preparatory Period of one week. | First Period of four weeks. | Second Period of four weeks. | Third Period of four weeks. |
|---|---|---|---|---|---|
| Corn ensilage | Lb. | ..... | 40 | 100 | ..... |
| Hay | " | ..... | ..... | ..... | 40 |
| Roots (mangels or carrots) | " | ..... | 30 | 30 | 30 |
| Meal (equal parts by weight of wheat bran, ground pease, barley, oil-cake and cotton-seed meal) | " | ..... | 10 | 10 | 10 |
| | | ..... | 80 | 140 | 80 |
| (For composition of ration for preparatory period, see page 72.) | | | | | |
| Quantity consumed per cow, per day | Lb. | 54 | 134·6 | 122·3 | 48·3 |
| Quantity of meal per cow, per day | " | ..... | 16·8 | 8·7 | 6·0 |
| Value of feed consumed per cow, per day | Cents. | ..... | 34·99 | 21·89 | 20·53 |
| Average quantity of milk per cow, per day | Lb. | 28·6 | 31·76 | 29·30 | 25·12 |
| do percentage of fat in milk | p.c. | ..... | 3·56 | ..... | ..... |
| do live weight per cow at beginning | Lb. | 1,175 | 1,094 | 1,255 | 1,220 |
| do do at end | " | 1,094 | 1,255 | 1,220 | 1,204 |
| Value of feed consumed per 100 lb. of milk produced | Cents. | ..... | 110·17 | 74·70 | 81·72 |

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TABLE VI.—Group III., Lot 6 (Miss Elgins, Fashion Book, Cherry Constance). Three Shorthorn cows. At 23rd March, when the first period of the test began, the average length of time from the commencement of their milking period was 121 days.

| Composition of Ration. | | Preparatory Period of one week. | First Period of four weeks. | Second Period of four weeks. | Third Period of four weeks. |
|---|---|---|---|---|---|
| Corn ensilage | Lb. | | | | 100 |
| Hay | " | | 20 | 40 | |
| Roots (mangels or carrots) | " | | 30 | 30 | 30 |
| Meal (equal parts by weight of wheat bran, ground pease, barley, oil-cake and cotton-seed meal) | " | | 10 | 10 | 10 |
| | | | 60 | 80 | 140 |
| (For composition of ration for preparatory period, see page 72.) | | | | | |
| Quantity consumed per cow, per day | " | 57· | 67·2 | 46·6 | 101· |
| Quantity of meal per cow, per day | " | | 11·2 | 5·8 | 7·2 |
| Value of feed consumed per cow, per day | Cents. | | 29·1 | 19·8 | 18· |
| Average quantity of milk per cow, per day | Lb. | 23·5 | 25·63 | 20·76 | 18·14 |
| do percentage of fat in milk | p.c. | | 3·75 | | |
| do live weight per cow at beginning | Lb. | 1,300 | 1,295 | 1,342 | 1,342 |
| do do at end | " | 1,295 | 1,342 | 1,342 | 1,290 |
| Value of feed consumed per 100 lb. of milk produced | Cents. | | 113·53 | 95·37 | 99·22 |

The teaching of the experiment points to the economy of:—

(1) Providing for milking cows a ration of succulent quality;

(2) Feeding as large a quantity of the feed as the animals will eat up clean; and

(3) Making the ration of such a gross and bulky composition that not more than from 6 to 8 pounds of meal—the concentrated and expensive part of the feed—will be consumed by the ordinary cow per day.

Corn ensilage of such quality as came from our silos was not in itself a complete or suitable feed for milking cows. During the period when it was fed alone the hair of the cows seemed dry, there was an absence of thrifty appearance, and the yield of milk fell off in the first period of four weeks by 22·6 per cent. There was an average gain in the yield of milk during the first period of four weeks, from the cows in each of the other five lots, of 6·5 per cent.

### *Feeding Mangels vs. Sugar-beets for a Short Period.*

An experiment to last for three weeks was undertaken on 7th December, to discover if any immediate and perceptible influence on the quantity and quality of the milk resulted from feeding sugar-beets in a ration, in place of mangels.

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Twenty-three milking cows were in three groups, according to their periods of lactation, for the experimental dairy tests reported upon in Tables V to X of the dairy experiments recorded in Part III of this report.

The ration fed from 7th to 13th December was composed of:—

| | Lb. |
|---|---|
| Corn ensilage | 40 |
| Mangels | 35 |
| Straw | 5 |
| Meal (barley, pease, oats) | 5 |
| | 85 |

The ration fed from 14th to 27th December was composed of:—

| | Lb. |
|---|---|
| Corn ensilage | 40 |
| Sugar beets | 35 |
| Straw | 5 |
| Meal (barley, pease, oats) | 5 |
| | 85 |

The milk was carefully weighed, the specific gravity was taken by the lacto-densimeter, and the percentage of fat was ascertained by the Babcock milk tester. The following Table shows the average results:—

TABLE VII.

| | From Mangels. | | From Sugar Beets. | |
|---|---|---|---|---|
| | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. |
| Average quantity of milk ..... Lb. | 8·29 | 6·48 | 7·72 | 5·42 |
| do specific gravity | 1,033·06 | 1,032·91 | 1,033·27 | 1,033·54 |
| do per cent of fat in milk ..... p.c. | 4·13 | 4·76 | 4·16 | 4·75 |

This experiment does not indicate that there was any appreciable difference in the quantity or richness of the milk, due to the substitution of sugar-beets for mangels. An examination of the butter which was made revealed the fact that the butter made during the period when sugar-beets were fed had a firmer body and a finer flavour than that which was made during the period when mangels were being fed.

*Feeding Calves.*

Very many enquiries have come to the office by mail, asking for information and advice on the feeding and raising of calves for the dairy. At my suggestion one of my assistants in the Dairy Commissioner's branch, Mr. J. W. Hart, prepared the following short article on that subject. Mr. Hart has proven by his work that he has special aptitude and ability in the care of dairy stock; and I consider the matters of advice contained in his article to be so much to the point, and capable of so much service to the stock-raisers of Canada, that I introduce it here in his own bright language.

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(Written by J. W. Hart).

A knowledge of the principles which underlie the science of feeding will materially aid any one who essays to raise dairy stock; and no class of stock upon the farm will more fully respond to judicious, intelligent and generous treatment than will the calves. No saving can be effected by stinting calves in their feed. The man who starves his young stock through greed of gain, and in accordance with his false notions of economy, is not a capable stock-raiser or feeder. Aside from a humanitarian standpoint, what shall it profit a man if he feed a calf twelve months to attain a weight that could have been laid on in one-half the time? A stunted, dejected-looking calf, and the loss of the food necessary to maintain its miserable existence for six months is the ordinary result. Nor is this all. If the calf be raised for the dairy it will seldom outlive the effects of its early treatment. The difference between what such a cow is, and what she might have been—extending over a period of years, and to her offspring—will keep hundreds of dollars out of the stock-raiser's pocket.

The feeding of a calf commences before the calf is dropped. Before calving, the cow should be fed liberally with suitable food, that the calf may be strong and vigourous, and the flow of milk large.

"Milk is the natural food of the young of all mammalia." But, except in a few instances (and they are rarer than many of our breeders of thoroughbred stock suppose), milk—the model and perfect food—is too expensive a diet for the calves. Therefore, some owners of cows knock the calves on the head; but others prefer to raise them. The object of this article is to show how this may be accomplished with profit. I would not advise any one to raise all the calves dropped in his herd. It matters not how excellent the herd may be, there will be some weakly calves, and calves from the poorest milkers, that cannot be raised with profit or advantage.

Milk being a perfect food, supplying all the elements necessary for the growth of bone, muscle, nerve and sinew, for repairing waste and maintaining the animal heat, "it must follow as the night the day," that the more closely we can get our substitutes to resemble milk, in character and composition, the more rational and correspondingly successful will our practice be. The following is an average of a number of analyses of milk:—

| | | |
|---|---|---|
| Water | 87·25 | per cent. |
| Fat | 3·50 | do |
| Albuminoids | 3·90 | do |
| Sugar | 4·60 | do |
| Ash | ·75 | do |

In this article I shall not attempt a description of these constituents and their functions in the animal economy. If the fat be taken from the milk in the form of butter it should be replaced by a cheaper food, rich in fat. Flax-seed is such a food, and its mucilaginous character when cooked specially adapts it to the tender mucous coat of the alimentary tract of the young animal. If flax-seed be difficult to obtain, linseed-meal, oatmeal, pease-meal or cotton-seed meal may be used. If whey be used as the basis of a ration, it should be fed sweet. Owing to its watery character, more grain should be fed with it than with skim-milk. Whatever meal is fed in milk or whey should be cooked.

I think it best to let the calf get its fill two or three times from the dam in nature's own way. Then feed it twice a day on whole milk, warm from the cow, until it is a week old. A gallon at a feed will be as much as an ordinary calf can assimilate. To teach a calf to drink, back it into a corner, get astride of its neck, and set the pail containing the milk down in front of it; place the first two fingers of the right hand in its mouth, keeping the palm of the hand over its nose. As soon as the calf commences to suck, lower its nose into the pail of milk; the calf will continue to suck, drawing the milk through the canal formed by the fingers; gently remove the fingers, keeping the calf's nose—not its nostrils—below the surface. If it keeps on drinking, the victory is won; but if objecting to this—to it unnatural

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treatment—it ducks its head to the bottom of the pail and jerks it up again, spouting the milk all over you, don't swear and maul the innocent little stranger with a milking stool. Two or three lessons will usually be successful in teaching the most obstinate calf to drink. It becomes more difficult to teach calves to drink as they get older, but it can be done by persistence, patience and gentleness. After the first week, one-half of the new milk may be replaced by sweet skim-milk, with the addition of half a teacupful of flax-seed jelly. Instead of flax-seed, oil-cake, oil-meal, oat-meal, middlings or pease-meal may be fed—the last named sparingly, as it is constipating in tendency. The flax-seed may be gradually increased to half a pound a day for a calf of three months. Keep some clean, bright hay and chopped grain where the calf can reach it, and it will soon learn to eat. Don't be afraid that it will eat too much of these things.

In feeding calves there is a danger that the milk will be swallowed too rapidly, and thus produce indigestion and scouring. For young calves a nipple is often used, which obviates that difficulty. Half a teaspoonful of rennet-extract in the milk will correct the tendency to scours, and will prove an excellent promoter of digestion. If scouring be noticed, don't dose the calf with powerful astringents, but decrease the ration of milk, and to it add a teacupful of boiled flour.

Where two or more calves are fed together, keep them tied up while feeding, and for a short time afterwards, so that they cannot suck each other.

Feed regularly twice or three times a day, and have the milk at blood heat. Never feed cold milk to a young calf. It is better that the same person should attend the calves regularly.

Calves should be allowed access to pure water and salt. Don't miss the effects of good feeding, by allowing them to suffer for these prime necessaries.

After the calf is four months old, if milk be scarce, gradually lessen the quantity fed, until at the age of six or seven months it may be dispensed with entirely.

Exercise is beneficial, especially to calves intended for the dairy. The run of a grass plot should be given where convenient. The calf pen should be kept dry and clean.

Study the nature of the animal; respect its preferences; anticipate its wants; treat it kindly; be a watchful, intelligent feeder; and verily thou shalt not fail to raise good calves.

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## PART II.—SWINE.

Of thoroughbred swine there were purchased during the year:

*Berkshire.*

One boar, from Mr. Thomas Teasdale, Concord, Ont.

*Tamworths.*

One boar and one sow, from Messrs. J. L. Grant & Co., Ingersoll, Ont.

*Poland Chinas.*

Two sows (pure bred, but not now eligible for registration), from Messrs. W. M. & J. C. Smith, Fairfield Plains, Ont.

A number of grade pigs were purchased, with which to carry on experiments, of which some are still in progress.

Provision has been made for crossing some of the longer and leaner breeds, such as the Improved Large Yorkshires and Tamworths, on the shorter and more hardy breeds, such as the Essex, Berkshire, &c. The ultimate object will be to discover what cross or pure-bred swine will give the largest yield in weight, and the best quality of meat for every pound of feed consumed. A few feeding tests for a comparison of the cross-bred pigs are in progress at this writing.

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## Experiments in the Fattening of Swine.

In November, 1890, 24 grade pigs were purchased. Eight of them were white, and apparently grades of Chester whites; 16 of them were nearly all black, and were evidently grades of Berkshires. They were divided into six lots of four pigs in each.

The eight white pigs were put into pens Nos. 1 and 2, and the two lots of four each were, as nearly as possible, alike in weight and appearance. Both lots were fed on a mixture of grain, consisting of equal parts of ground pease, barley and rye. The object of this experiment was two-fold—(1) to discover the difference, if any, in the quantity of grain required to produce every pound of increase in the live weight of the swine, when *fed steamed and warmed* in the one case, and when *fed raw and cold* in the other case; (2) to obtain a record of the comparative quantities of grain required to produce every pound of increase in the live weight of the swine, during the different stages of the feeding period.

The mixture of grain was fed wet in both cases. Cold water was given to drink. A mixture of salt and wood ashes was kept in a box on the floor of each pen, where the pigs had access to it at will. The feed was weighed every day, and the swine once every week. In the following Table the feeding period has been arranged into five periods of four weeks each, and one period of three weeks. It shows the gain in weight and the quantities of grain consumed.

Table I.

| —— | 9th December. | 5th January. | 2nd February. | 2nd March. | 30th March. | 27th April. | 18th May. | Totals. |
|---|---|---|---|---|---|---|---|---|
| *Pen 1—Four Swine—* | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. |
| Fed on a mixture of ground pease, barley and rye, *fed steamed and warmed:* | | | | | | | | |
| Live weight | 302 | 407 | 614 | 808 | 917 | 974½ | 745* | *Three swine only. |
| Gain in weight | .... | 105 | 207 | 194 | 109 | 57½ | 30 | 702½ gain in weight. |
| Feed consumed | .... | 348 | 637 | 736 | 545 | 406 | 256 | 2,928 grain consumed. |
| Feed consumed per lb. gain in live weight | | | | | | | | 4·16 grain. |
| *Pen 2—Four Swine—* | | | | | | | | |
| Fed on a mixture of ground pease, barley and rye, *fed raw and cold :* | | | | | | | | |
| Live weight | 308 | 413½ | 597 | 723 | 781½ | 830½ | 872 | ..... |
| Gain in weight | .... | 105½ | 183½ | 126 | 58½ | 49 | 41½ | 564 gain in weight. |
| Feed consumed | .... | 348 | 563 | 558 | 413½ | 278½ | 237 | 2,398 grain consumed. |
| Feed consumed per lb. gain in live weight | | | | | | | | 4·25 grain. |
| *Pens 1 and 2—* | | | | | | | | |
| Average feed consumed per lb. of gain in live weight | .... | 3·31 | 3·07 | 4·04 | 5·73 | 6·45 | 6·93 | |
| Percentage of increase in feed consumed per lb. of gain in live weight | .... | .... | .... | 31% | 86% | 110% | 125% | |

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(1). RESULTS :—Taking in the whole period, extending from 9th December to 18th May, 4·16 pounds of the mixture of grain, ground pease, barley and rye, were consumed for every pound of increase in the live weight, when fed steamed and warm, against 4·25 pounds of the grain when fed raw and cold.

(2). The swine, on the steamed and warm feed, gained 702½ pounds in live weight, against 564 pounds of gain by the swine on the raw and cold feed; but the former consumed 2,928 pounds of grain, as against 2,398 pounds of grain consumed by the latter. That indicates that when feed was provided, steamed and warm, the swine consumed larger quantities of it than when fed raw and cold; they also gained faster in weight, but every pound of increase in weight cost practically as much in grain in the one case as in the other. There was nothing to compensate for the labour and expense of the steaming.

(3). There was a marked and gradual increase in the quantity of grain consumed per pound of gain in live weight, after the second month of the feeding. That will be presented again in another Table.

EIGHT OF THE BLACK PIGS were put into Pens Nos. 3 and 4. The pigs in Pen 3 were as nearly as possible similar in weight and appearance to those in Pen 4.

In this experiment, the object was to discover the value, if any, of clover ensilage for the feeding and fattening of swine of an average weight of 64 pounds each.

Records were also kept, to ascertain the comparative quantities of feed required to produce every pound of increase in the live weight of the swine, during the different stages of the feeding period.

The pease ensilage was prepared by harvesting the crop when the earliest pods were filled and before the pease became hard. The vines were green and succulent. The ensilage was well preserved. The pigs in Pen 3 were fed an allowance of grain, a mixture of equal parts of ground pease, barley and rye, but not as much as they would have eaten readily. They were fed also a quantity of pease ensilage. The pigs in Pen 4 were fed upon pease ensilage only. In both cases the pigs refused to eat more than a small portion of whatever quantity of pease ensilage was offered to them. The remainder was nosed over, pushed about and tramped on. When what was left uneaten was weighed out of the pens it was very wet.

Both lots of pigs were allowed cold water to drink, and a mixture of salt and ashes was accessible to the pigs in both pens. The pease ensilage did not seem to have any feeding value to the pigs which received an allowance of grain; and the pigs in Pen 4 steadily decreased in weight for nine weeks, when the feeding of ensilage was ended.

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The following Table contains the details of the weights of pigs, feed consumed, and rate of gain in live weight:—

TABLE II.

| —— | 29th December. | 5th January. | 2nd February. | 2nd March. | 30th March. | 27th April. | 18th May. | Totals. |
|---|---|---|---|---|---|---|---|---|
| *Pen 3—Four Swine—* | | | | | | | | |
| Fed on a mixture of ground pease, barley and rye, *fed steamed and warmed*, and pease ensilage— | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. |
| Live weight | 254 | 267 | 414 | *379 | 442 | 494 | 548 | *Three swine only. |
| Gain in weight | .... | 13 | 147 | 74 | 63 | 52 | 54 | 403 gain in weight. |
| Feed consumed { Grain | .... | 63 | 474 | 335 | 287 | 260 | 243 | 1,662 grain consumed. |
| Feed consumed { Pease ensilage | .... | 112½ | 682 | 345 | | | | |
| Pease ensilage left uneaten (wet) | .... | 100 | 625 | 319 | | | | |
| Grain consumed per lb. of gain in live weight | .... | .... | .... | .... | .... | .... | .... | 4·12 grain. |
| *Pen 4—Four Swine—* | | | | | | | | |
| Fed on pease ensilage only until 2nd March— | | | | | | | | |
| Live weight | 256 | 237 | 223 | 205 | | | | |
| Loss in weight | .... | 19 | 14 | 18 | .... | .... | .... | 51 loss in weight. |
| Pease ensilage fed | .... | 235 | 1401 | 2127 | | | | |
| do left uneaten (wet) | .... | 150 | 938 | 1409 | | | | |
| After 2nd March, fed on a mixture of ground pease, barley and rye, *fed raw and cold*— | | | | | | | | |
| Live weight | .... | .... | .... | 205 | 395½ | 512½ | 571 | |
| Gain in weight | .... | .... | .... | .... | 190½ | 117 | 58½ | 366 gain in weight. |
| Feed consumed | .... | .... | .... | .... | 443 | 388 | 327 | 1,158 grain consumed. |
| do per lb. of gain in live weight | .... | .... | .... | .... | 2·32 | 3·31 | 5·59 | 3·16 grain. |
| *Pens 3 and 4—* | | | | | | | | |
| Average feed consumed per lb. of gain in live weight | .... | 4·84 | 3·22 | 4·52 | 2·88 | 3·83 | 5·06 | |

THE OTHER EIGHT BLACK PIGS—Berkshire grades—were put into Pens Nos. 5 and 6, and the two lots were as nearly similar in appearance and weight as possible. The objects of this experiment were the same as those in the experiment with the swine in Pens 1 and 2. The method of conducting it was similar, with the difference of sugar beets being fed to the swine in both pens, with the grain mixture.

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Table III shows the weights of the swine, the gains in weight, and the quantities of feed consumed.

TABLE III.

| —— | 9th December. | 5th January. | 2nd February. | 2nd March. | 30th March. | 27th April. | 18th May. | Totals. |
|---|---|---|---|---|---|---|---|---|
| *Pen 5—Four Swine—* | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. |
| Fed on a mixture of ground peas, barley and rye, *fed steamed and warmed*, and sugar beets— | | | | | | | | |
| Live weight | 187 | 258 | 425 | 581 | 669 | 744½ | 812 | |
| Gain in weight | .. | 71 | 167 | 156 | 88 | 75½ | 67 | 625 gain in weight. |
| Feed consumed { Grain | .... | 333 | 412 | 540 | 475 | 369 | 282 | 2,411 grain consumed. |
| Feed consumed { Sugar beets | .... | 44½ | 330 | 313 | 320 | 308 | 224 | 1,538 sugar beets consumed. |
| Feed consumed per lb. of gain in live weight | .... | .... | .... | .. | .... | .... | .... | { 3·86 grain. 2·46 sugar beets. |
| *Pen 6—Four Swine—* | | | | | | | | |
| Fed on a mixture of ground peas, barley and rye, *fed raw and cold*, and sugar beets— | | | | | | | | |
| Live weight | 201 | 272 | 415 | 547 | 692 | 731 | 772 | |
| Gain in weight | .... | 71 | 143 | 132 | 145 | 39 | 41 | 571 gain in weight. |
| Feed consumed { Grain | .... | 225 | 396 | 503 | 458 | 371 | 270 | 2,223 grain consumed. |
| Feed consumed { Sugar beets | .... | 60 | 320 | 307 | 310 | 322 | 244 | 1,563 sugar beets consumed. |
| Feed consumed per lb. of gain in live weight | .... | .... | .... | .... | .... | .... | .... | { 3·89 grain. 2·73 sugar beets. |
| *Pens 5 and 6—* | | | | | | | | |
| Average feed consumed per lb. of gain in live weight { Grain | .... | 3·93 | 2·61 | 3·62 | 4·00 | 6·50 | 5·41 | |
| Average feed consumed per lb. of gain in live weight { Sugar beets | .... | 0 72 | 2·10 | 2·15 | 2·73 | 5·52 | 4·53 | |
| *Percentage of increase in feed consumed per lb. of gain in live weight | .... | .... | .... | 21 per ct. | | 90 per ct. | | |
| *1 lb. grain equal to 5 lb. sugar beets. | .... | .... | .. | ..... | | ..... | | |

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The following Table shows the quantities of feed consumed per pound of gain in live weight, during each of the six feeding periods. The duration of each feeding period was four weeks, with the exception of the first period for Pens 4 and 5, and the last period for all the Pens, which was three weeks. The grain fed in each case was a mixture of equal parts of ground pease, barley and rye. No notice is taken in this Table of the pease ensilage fed to Pens 4 and 5, as it did not appear to have any appreciable feeding value in these cases.

TABLE IV.—Pounds of Feed consumed per pound of gain in the live weight of swine.

| — | Pen 1, 4 Swine; Grain, Fed Steamed and Warm. | Pen 2, 4 Swine; Grain, Fed Raw and Cold. | Pen 3, 4 Swine; Grain, Fed Steamed and Warm. | Pen 4, 4 Swine; Grain, Fed Raw and Cold. | Pen 5, 4 Swine; Grain, Fed Steamed and Warm, and Sugar Beets. | | Pen 6, 4 Swine; Grain, Fed Raw and Cold, and Sugar Beets. | |
|---|---|---|---|---|---|---|---|---|
| Feeding Periods. | Grain, Lb. | Grain, Lb. | Grain, Lb. | Grain. Lb. | Grain, Lb. | Sugar Beets, Lb. | Grain, Lb. | Sugar Beets, Lb. |
| First | 3·31 | 3·30 | 4·84 | ..... | 4·69 | 0·61 | 3·17 | 0·84 |
| Second | 3·07 | 3·07 | 3·22 | ..... | 2·46 | 2·00 | 2·76 | 2·23 |
| Third | 3·79 | 4·43 | 4·52 | ..... | 3·46 | 2·00 | 3·81 | 2·32 |
| Fourth | 5·00 | 7·07 | 4·55 | 2·32 | 5·40 | 3·63 | 3·15 | 2·13 |
| Fifth | 7·06 | 5·68 | 5·00 | 3·31 | 4·88 | 4·08 | 9·51 | 8·25 |
| Sixth | 8·53 | 5·71 | 4·50 | 5·59 | 4·17 | 3·31 | 6·58 | 6·00 |
| Average | 4·16 | 4·25 | 4·12 | 3·16 | 3·86 | 2·46 | 3·89 | 2·73 |

CONCLUSIONS.—The teaching of these three sets of experiments is to the effect that :—

(1.) There is no appreciable difference in the number of pounds of grain required to produce every pound of increase in the live weight of swine, when fed steamed and warm, as against fed raw and cold;

(2.) On the average there is a gradual increase in the quantity of feed consumed, for every pound of gain in live weight of swine, after the second month of their feeding period and after the average live weight exceeds 100 lb.;

(3.) It is economical to market swine for slaughtering when they weigh from 180 to 200 lb. alive;

(4.) The *largest* consumption of feed per day by swine is at or near the period of their feeding, when the number of pounds of feed consumed, per pound of increase in weight, is *lowest;*

(5.) For the increase of weight by 3,231½ lb. in 24 swine, 4·14 lb. of a mixture of ground pease, barley and rye were required for every pound of increase in live weight.

Several series of feeding tests are in progress, mainly for the purpose of determining the relative values of (1) ground grain and whole grain; (2) of grain and skim milk; and (3) of frozen wheat from Manitoba and North-West Territories. At this writing, the quantity of ground frozen wheat consumed per pound of increase in live weight has been 5·30 lb., with swine weighing from 185 lb. to 275 lb. live weight each, and 3·93 lb. of ground frozen wheat per pound of increase in live weight with swine weighing from 70 lb. to 105 lb. each.



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## PART III.—EXPERIMENTAL DAIRY WORK.

The experimental dairy building on the farm, which was described in the annual report for 1890, was completed early in 1891. A cut of it appears underneath.

The machinery and apparatus are adequate for the present needs of the farm, and enable us to carry on investigations which are considered to be capable of rendering the most immediate and practicable service to the dairymen of the country.

An 8 h. p. boiler and 6 h. p. steam engine were purchased from Mr. Geo. Low, of Ottawa, who also fitted up the steam pipes and shafting throughout the building.

A hand-power centrifugal cream separator, manufactured by Burmeinster & Wain, of Copenhagen;

A No. 4 "Alexandra" centrifugal cream separator, and a No. 8 "Alexandra" centrifugal cream separator for operation by hand-power, manufactured by R. A. Lister & Co., Dursley, England;

One No. 5 Daisy revolving barrel churn of fourteen gallons' capacity, and two No. 2 Daisy churns of four gallons capacity each;

A Boyd cream ripening vat, and fermentation starter vat;

A lever butter worker for hand use;

Several Babcock milk-testers;

Two pairs of weighing scales; and the usual outfit of small dairy utensils, such as deep-setting milk pails, 20" x 8½" diam., shallow milk pans, strainer, skimmer, butter printer, thermometers, water pails, hot water and cold water tanks, washing sink, brushes, etc., furnish the dairy with conveniences for carrying on its work.

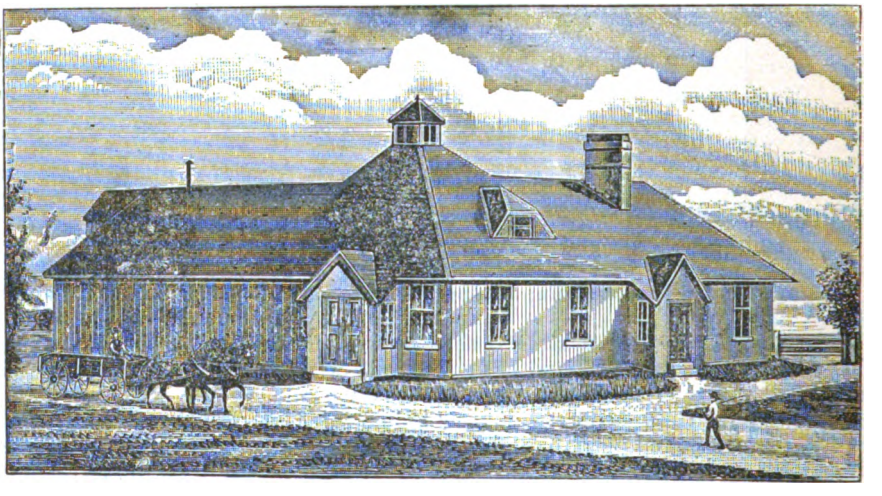

FIG. IV.—Dairy Building, Central Experimental Farm.

Besides these, there are several tables, and a milk-setting tank which merits particular description for the information of farmers. The tank is constructed of 2-inch pine lumber; its length is 7 ft. 6 in.; its width 2 feet, and its depth 2 feet. These are inside measurements. It is divided into four compartments, each 21 x 24 x 24 inches. That size gives sufficient space for the setting of four deep-setting milk pails in each. Cold water is led into each compartment by means of a pipe which runs down to within 1 inch from the bottom. The overflow of water—when it has been slightly warmed by contact with the milk-pails—is carried off by a pipe at its surface. Where the supply of cold water is limited, this method of leading the cold water to *near the bottom of the tank*, and conducting the water which has been warmed from the surface to the overflow pipe or drain, will enable the cooling power of the water to be used most economically. The overflow water may be in excellent condition for the watering of stock, where and when water for both purposes is scarce.

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PARTICULARS OF EXPERIMENTS.

In the course of the experimental work of the year a great mass of valuable data has been accumulated in the records. As far as experiments have been completed, or even advanced sufficiently to furnish useful guidance for dairymen in their practice, they will be reported upon. The tests for comparison between the centrifugal cream separators and the setting methods are not ready to be reported on in full, as it is considered desirable to make a record of the results which are found during every month of the year before any definite conclusion is announced.

Instead of burdening the pages of the report with the details of single tests only, a statement of the average results of from 4 to 12 tests will be presented in most of the different experiments. Our herd of milking cows contains animals of seven different breeds, beside grade milch cows. When not otherwise specified, the milk used in the experiment was mixed herd milk.

*Experiments in Deep-setting of Milk at different Temperatures.*

The test was conducted for six days—28th May to 4th June—and included six settings of morning milk and six settings of evening milk in each case. The whole quantity of milk used was herd milk, and was thoroughly mixed in a large vessel before it was divided into three lots. The setting period was 22 hours. Table I shows the average results from the 12 tests:—

TABLE I.

| Temperature of Milk when set. | 98° Fahr. | 88° Fahr. | 78° Fahr. |
|---|---|---|---|
| Quantity of milk set..... Lb. | 35 | 35 | 35 |
| Per cent of butter-fat in milk..... | 3·48 | 3·48 | 3·48 |
| Temperature of water..... Fahr. | 49° | 49° | 49° |
| Quantity of skim-milk..... Lb. | 29·6 | 29·8 | 30·25 |
| Per cent of butter-fat in skim-milk ..... | 0·62 | 0·64 | 0·71 |
| Quantity of fat in whole milk..... Lb. | 1·22 | 1·22 | 1·22 |
| do left in skim-milk..... " | 0.183 | 0·190 | 0·214 |
| Percentage unrecovered ..... | 15·04 | 15·63 | 17·60 |

This experiment shows that the loss of butter-fat—unrecovered from the skim-milk—was only ·59 of 1 per cent greater, when milk was set 88° Fahr., than when it was set 98° Fahr.; and that the loss of unrecovered butter-fat was 2·53 per cent greater when milk was set at 78° Fahr. than when it was set at 98° Fahr.

*Experiment in Immediate vs. Delayed Setting of Milk.*

This test was conducted for six days—from 27th July to 2nd August—and included six settings of morning milk and six settings of evening milk in each case. The milk was herd milk, and was mixed immediately after milking, before it was divided into two lots. One lot was set at once in a deep-setting pail, in ice water, of a temperature of 38° Fahr.; another lot was left in a pail in the dairy room for one hour, and was then set in ice water, under conditions precisely similar. The following Table shows the average results from the morning and evening tests:—



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TABLE II.

| | Morning Milk. | | Evening Milk. | |
|---|---|---|---|---|
| | Immediate setting. | Delayed one hour. | Immediate setting. | Delayed one hour. |
| Quantity of milk set ..... Lb. | 35 | 35 | 35 | 35 |
| Per cent of butter-fat in milk..... | 3·53 | 3·53 | 3.93 | 3·93 |
| Temperature when set .....Fahr. | 98° | 88° | 98° | 88° |
| Per cent of butter-fat in skim-milk.. ..... | ·48 | ·96 | ·65 | 1·20 |
| Highest per cent of butter-fat in skim-milk.. ..... | ·9 | 1·2 | ·9 | 1·8 |
| Lowest do do do ..... | ·4 | ·75 | ·4 | ·7 |
| Setting period in hours..... ..... | 22 | 21 | 22 | 21 |
| Quantity of fat in whole milk..... ..... Lb. | 1·23 | 1·23 | 1·37 | 1·37 |
| do left in skim-milk..... ..... " | 0·139 | 0·278 | 0·188 | 0·348 |
| Percentage unrecovered..... ..... | 11·31 | 22·63 | 13·76 | 25·40 |

This experiment shows that the loss of unrecovered butter-fat—which was left in the skim-milk—was 11·48 per cent greater, when the setting of milk in deep-setting pails in ice water was delayed one hour, than it was when the milk was set immediately.

*Experiment in Deep-setting of Milk for* 11 *Hours vs.* 22 *Hours.*

This test was continued for six days—from 12th August to 18th August—and comprised six settings of morning milk and six settings of evening milk in each case. The milk was mixed herd milk, and was set immediately after it reached the dairy building in deep-setting pails, in ice water of a temperature of 38° to 40° Fahr.

Table III shows the average results from the 24 settings of milk.

TABLE III.

| | Morning Milk. | | Evening Milk. | |
|---|---|---|---|---|
| Setting Period... | 11 Hours. | 22 Hours. | 11 Hours. | 22 Hours. |
| Quantity of milk set..... Lb. | 35 | 35 | 35 | 35 |
| Per cent of butter-fat in milk .... ..... | 3·61 | 3·61 | 4·27 | 4·27 |
| Temperature when set .....Fahr. | 96° | 96° | 95° | 94° |
| Per cent of butter-fat in skim-milk.. ..... | ·98 | ·55 | ·97 | ·65 |
| Highest per cent of butter-fat in skim-milk..... | 1·4 | ·8 | 1·6 | ·8 |
| Lowest do do do ..... | ·7 | ·3 | ·8 | ·4 |
| Quantity of fat in whole milk..... Lb. | 1·26 | 1·26 | 1·49 | 1·49 |
| do left in skim-milk..... " | 0·284 | 0·159 | 0·281 | 0·188 |
| Percentage unrecovered.... ..... | 22·55 | 12·65 | 18·87 | 12·65 |

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This experiment shows that the loss of unrecovered butter-fat was 9·9 per cent greater for the morning milk, and 6·22 per cent greater for the evening milk, when the milk was set in deep pails for 11 hours, than it was when the milk was set for 22 hours.

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*Experiment on the effect of adding Water to Milk in Deep-setting.*

The test was carried on for six days—from 24th September to 1st October—and included six settings of morning milk and six settings of evening milk, or 36 settings in all. The milk used was herd milk, and was mixed in one vessel, before any difference of treatment was given. To one lot, 25 per cent of water at a temperature of 160° Fahr. was added; to another lot, 25 per cent of water at a temperature of 60° Fahr. was added; and the third lot was set under similar conditions with the others, and without the addition of any water.

The following Table shows the average results from 12 settings in each case; the setting period was 22 hours:—

TABLE IV.

| — | 25 per cent of Water at 160° Fahr. added. | 25 per cent of Water at 60° Fahr. added. | No Water added. |
|---|---|---|---|
| Quantity of milk set..... Lb. | 25 | 25 | 35 |
| Percentage of butter-fat in milk..... | 3·52 | 3·52 | 3·52 |
| Temperature of milk when mixed.....Fahr. | 92° | 92° | 92° |
| do milk when set..... | 110° | 82° | 92° |
| do water in tank..... | 38° | 38° | 38° |
| Percentage of fat left in skim-milk..... | ·63 | ·60 | 0 58 |
| Quantity of fat in whole milk ..... Lb. | 0·88 | 0·88 | 1·23 |
| do left in skim-milk..... " | 0·130 | 0·124 | 0·168 |
| Percentage unrecovered..... | 14·82 | 14·11 | 13·67 |

This experiment shows that there was practically no appreciable difference (1·15 per cent) between the percentages of unrecovered fat left in the skim-milk, when 25 per cent of water at 160° Fahr., 25 per cent of water at 60° Fahr., and no water added, were the differences of treatment in the setting of milk, in deep-setting pails in ice water.

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*Four Experiments in the Creaming of Milk from Cows at different stages of Lactation, by the Deep-setting method.*

For these tests, which were conducted in November, the cows of the herd were divided into three groups, according to the length of time during which they had been milking since the last calving.

Group I contained the cows which had been milking for periods ranging from 8 to 11 months, and was made up of 1 Shorthorn, 1 Shorthorn grade, 2 Jerseys, 1 Holstein, 1 Devon and 1 Quebec Jersey.

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Group II contained the cows which had been milking for periods ranging from 5 to 7 months, and was made up of 6 Quebec Jerseys, 2 Shorthorn grades and 1 Devon.

Group III contained the cows which had been milking for periods ranging from 1 to 3 months, and was made up of 3 Ayrshires, 3 Holsteins, 2 Shorthorns, 1 Shorthorn grade and 1 Polled Angus.

The setting period in all cases was 22 hours.

THE FIRST EXPERIMENT was conducted for five days. The milk was set in cold water, in which no ice was used, of a temperature of 47° Fahr.

Table V shows the average results from five tests of the setting of morning milk and five tests of the setting from evening milk of each group, or 30 settings in all :—

TABLE V.

| | Group I. | | Group II. | | Group III. | |
|---|---|---|---|---|---|---|
| | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. |
| Quantity of milk set. ..... .....Lb. | 33 | 31 | 34 | 30 | 35 | 35 |
| Per cent of butter-fat in whole milk.... | 3·86 | 4·26 | 3·80 | 4·17 | 2·86 | 3·6 |
| Temperature when set .... ... ..Fahr. | 87° | 88° | 89° | 87° | 91° | 91° |
| Per cent of butter-fat left in skim-milk.. | 1·14 | 1·55 | 1·84 | 1·5 | ·65 | 1·13 |
| Quantity of fat in whole milk.....Lb. | 1·27 | 1·32 | 1·29 | 1·25 | 1·00 | 1·26 |
| do left in skim-milk.... " | 0·311 | 0·398 | 0·518 | 0·372 | 0.188 | 0·327 |
| Percentage unrecovered..... .. | 24·54 | 30·15 | 40·18 | 29·82 | 18·85 | 26·00 |

THE SECOND EXPERIMENT in this series was continued for four days. The milk was set immediately after it reached the dairy building from the stables, in ice water, which was maintained at a temperature of 38° Fahr.

Table VI shows the results from the four settings of morning milk and the four settings of evening milk, from each group, or 24 settings in all :—

TABLE VI.

| | Group I. | | Group II. | | Group III. | |
|---|---|---|---|---|---|---|
| | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. |
| Quantity of milk set..... .Lb. | 35 | 27 | 35 | 31 | 35 | 34 |
| Per cent of butter-fat in whole milk.... | 3·95 | 4·42 | 3·9 | 4·17 | 2·8 | 3·15 |
| Temperature when set .....Fahr. | 89° | 92° | 92° | 94° | 93° | 95° |
| Per cent of fat left in skim-milk..... | 1·2 | 1·7 | 1·05 | 1·05 | ·45 | ·55 |
| Quantity of fat in whole milk .....Lb. | 1·38 | 1·19 | 1·36 | 1·29 | 0·98 | 1·07 |
| do left in skim-milk... " | 0·348 | 0·380 | 0·304 | 0·269 | 0·130 | 0·154 |
| Percentage unrecovered..... ... . .. | 25·22 | 31·95 | 22·39 | 20·85 | 13·26 | 14·48 |

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THE THIRD EXPERIMENT in the series lasted for four days. The milk was re-heated to 98° Fahr. after it reached the dairy building, and was set immediately thereafter in ice water, which was maintained at a temperature of 38° Fahr.

Table VII shows the results from the four settings of morning milk and the four settings of evening milk, from each group, or 24 settings in all :—

TABLE VII.

| | Group I. | | Group II. | | Group III. | |
|---|---|---|---|---|---|---|
| | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. |
| Quantity of milk set ..... Lb. | 32 | 26 | 34 | 31 | 35 | 34 |
| Per cent of butter-fat in whole milk. .. | 3·71 | 3·9 | 3·8 | 4·2 | 3·1 | 3·6 |
| Temperature when set..... .....Fahr. | 98° | 98° | 98° | 98° | 98° | 98° |
| Per cent of fat left in skim-milk..... | 1·5 | 1·65 | 1·15 | 1·02 | ·45 | ·52 |
| Quantity of fat in whole milk. ... Lb. | 1·19 | 1·01 | 1·29 | 1·30 | 1·08 | 1·22 |
| do in skim-milk..... " | 0·397 | 0·356 | 0·324 | 0·308 | 0·130 | 0·146 |
| Percentage unrecovered..... | 33·40 | 35·19 | 25·11 | 23·70 | 12·08 | 12·00 |

THE FOURTH EXPERIMENT in the series extended over five days. To the milk from Groups I and II, 10 per cent of water was added before it was set; the milk from Group III was delayed in setting for half an hour, then reheated to 98° Fahr., and set immediately afterwards, without the addition of water.

Table VIII shows the results from the five settings of morning milk and the five settings of evening milk from each group, or 30 settings in all :—

TABLE VIII.

| | Group I. | | Group II. | | Group III. | |
|---|---|---|---|---|---|---|
| | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. |
| Quantity of milk set..... .. ...Lb. | 33 | 25 | 34 | 31 | 35 | 35 |
| Per cent of butter-fat in whole milk... | 3·70 | 3·96 | 3·52 | 3·8 | 3· | 3·24 |
| do water added..... .... ... | 10 | 10 | 10 | 10 | 0 | 0 |
| Temperature when set.....Fahr. | 98° | 98° | 98° | 98° | 98° | 98° |
| Per cent of fat in skim-milk. ..... | 1·75 | 1·40 | 1·25 | 1·26 | ·54 | ·62 |
| Quantity of fat in whole milk ..... Lb. | 1·22 | 0·99 | 1·20 | 1·18 | 1·05 | 1·13 |
| do skim-milk ... ... " | 0·478 | 0·290 | 0·352 | 0·324 | 0·156 | 0·180 |
| Percentage unrecovered..... .. | 39·22 | 29·29 | 29·34 | 27·43 | 14·91 | 15·91 |

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The next Table has been arranged to show the relative efficiency of the creaming which resulted from the different treatments of the milk, in each of the four experiments of the series. The comparison between the different treatments requires this explanation: The different treatments were given to the milk of the same cows upon four consecutive weeks. That did not afford a basis, for a comparison of the effects of different setting conditions on milk, as sufficient or as reliable as when different portions of herd milk, from the same cows on the same day, are subjected to different setting conditions for creaming. This experiment provided for treating the milk from the different groups alike on the same days, as the comparison was between the milks of the different groups, and not between the different methods of setting.

Table IX shows the percentage of unrecovered fat, which was left in the skim milk in the case of each of the three groups of cows, during each of the four experiments:—

TABLE IX.

| | Group I. | Group II. | Group III. |
|---|---|---|---|
| FIRST EXPERIMENT.—Milk set in water of a temperature of 47° Fahr. | 27·34 | 35·00 | 22·42 |
| SECOND EXPERIMENT.—Milk set in ice water of a temperature of 38° Fahr | 28·58 | 21·62 | 13·87 |
| THIRD EXPERIMENT.—Milk re-heated to 98° and set in ice water of a temperature of 38° Fahr. | 34·29 | 24·40 | 12·04 |
| FOURTH EXPERIMENT.—10 per cent of water added to milk of Groups I and II; milk of Group III delayed half an hour, then re-heated to 98° Fahr. | 34·25 | 28·38 | 15·41 |
| Average of four experiments | 31·11 | 27·35 | 15·93 |

These four experiments in the setting of milk in deep-setting pails, with 36 setting tests for the milk of each of three groups of cows, show:—

(1.) That 31·11 per cent of the butter-fat was not recovered from the skim-milk, in the case of the group of cows which had been milking for periods of from 8 to 11 months each.

(2.) That 27·35 per cent of the butter-fat was not recovered from the skim-milk, in the case of the group of cows which had been milking for periods of from 5 to 7 months each.

(3.) That 15·93 per cent of the butter-fat was not recovered from the skim-milk, in the case of the group of cows which had been milking for periods of from 1 to 3 months each.

*Experiment in Deep-setting, as compared with Shallow-pan Setting, with the Milk from Cows of Groups I and II.*

The cows which compcsed Groups I and II were the same as those described for the series of experiments which have been recorded in Tables V to IX. A portion in each case was set in an ordinary shot-gun, deep-setting pail, of 8½ inches diameter, set in water without ice, of a temperature of 45° Fahr.; another portion of the mixed milk was set in shallow-pans to a depth of 2½ inches.

The milk was set in each case for a period of 22 hours.

The test was continued for five days—8th to 12th December, 1891.

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The following Table shows the results:—

TABLE X.

| Method of Setting... | Group I (Milking 9 to 12 months). | | | | Group II (Milking 6 to 8 months). | | | |
|---|---|---|---|---|---|---|---|---|
| | Deep-setting. | | Shallow-pan. | | Deep-setting. | | Shallow-pan. | |
| | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. |
| Quantity of milk set..... Lb. | 19 | ..... | 8 | 8 | 24 | 24 | 8 | 8 |
| Per cent of butter-fat in milk . . | 4·1 | ..... | 4·1 | 4·8 | 4·1 | 4·6 | 4·1 | 4·6 |
| Temperature of milk when skimmed.. ..... ...Fahr. | 45° | ..... | 55° | 55° | 45° | 45° | 55° | 55° |
| Quantity of cream obtained...Lb. | 3·5 | ..... | 1·5 | 1·5 | 4· | 4· | 1·5 | 1·5 |
| do of skim-milk..... " | 15·5 | ..... | 6·5 | 6·5 | 20 | 20 | 6·5 | 6·5 |
| Per cent of fat left in skim-milk.. | 2·1 | ..... | ·27 | ·21 | 2·3 | 2·6 | ·25 | ·35 |
| Quantity of fat in whole milk.. Lb. | ·779 | ..... | ·328 | ·384 | ·984 | 1·104 | ·328 | ·368 |
| do of fat left in skim-milk .. .. ..... ..... " | ·325 | ..... | ·017 | ·014 | ·460 | ·520 | ·016 | ·022 |
| Percentage unrecovered.. ... .... | 41·72 | ..... | 5·18 | 3·65 | 46·75 | 47·10 | 4·88 | 5·98 |

This experiment shows that the loss of unrecovered butter-fat left in the skim-milk, from the milk of cows at the milking periods of from 6 to 12 months since calving, was 40·27 per cent greater when the milk was set in deep-setting pails, in water at a temperature of 45° Fahr., than when it was set in shallow-pans to a depth of 2½ inches.

During the winter season, as well as during the summer, it seems necessary, in order to obtain efficient creaming by means of deep-setting pails, to use ice-water of a temperature at or below 40° Fahr. That appears to be particularly essential in the setting of milk from cows which have been milking for periods of more than 6 months. To prevent any one from inferring a misleading conclusion from Table X, the following Table has been prepared to show the results from the testing of the mixed milk from the whole herd, for a period of three months. The trials of the different methods of separating the cream, of which the average results appear in Table XI, lasted for one week in every month in each case. The full report of this experiment, which is not yet completed, will appear in the next annual report.

TABLE XI.

| | Centrifugal Cream Separator. | Deep-setting in Ice-water at 38°. | Shallow-pan setting to depth of 2½ in. |
|---|---|---|---|
| Per cent of butter-fat in whole milk..... ..... ..... ..... | 3·82 | 3·81 | 3·82 |
| Quantity of milk per lb. of butter..... ..... . ..... .. .. Lb. | 23·71 | 25·97 | 24·91 |
| do butter obtained per lb. of butter-fat in whole milk " | 1·104 | 1·005 | 1·051 |

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The results of these experiments, and of the series of experiments recorded from Tables V to X, seem to indicate:—

(1.) That by the deep-setting of milk from cows which have been milking for periods of 5 to 12 months in cold water of a temperature of 45° or 48° Fahr., without the use of ice, about 37 per cent of the butter-fat was left in the skim-milk; and by setting in ice water of a temperature of 38° Fahr. about 28 per cent of the butter-fat was left in the skim-milk.

(2.) That during the fall and winter, particularly, the use of shallow-pans for the setting of milk from cows, which have been milking for periods of from 5 to 12 months, will permit the recovery in the cream of about 95 per cent of the butter-fat in the whole milk.

(3.) That the use of the centrifugal cream separator will enable the dairyman to recover practically the whole of the butter-fat into the cream, from the milk of cows at all stages of lactation, and during all seasons of the year.

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*Experiment in the Setting of Milk in a Cheese-factory Milk-can, 15 inches in diameter, and in a Shot-gun Can, 8½ inches in diameter.*

Among the patrons of cheese factories, the practice of using the cheese-factory milk-cans for the setting of milk for cream, after the close of the cheese-factory season, is a common one. A comparison between setting milk in a milk-can 15 inches in diameter and an ordinary shot-gun can 8½ inches in diameter, was made by setting morning milk for three days, and evening milk for three days, between 9th and 14th November. A quantity of herd milk was mixed before it was divided into two portions. It was put into the two cans, to an equal depth—about 19 inches. Both lots were set in ice-water, at 38° Fahr., for 22 hours.

The following Table shows the result:—

TABLE XII.

| | Milk-can, 15 inches diameter. | | Shot-gun Pail, 8½ inches diameter. | |
|---|---|---|---|---|
| | Morning Milk. | Evening Milk. | Morning Milk. | Evening Milk. |
| Quantity of milk in three settings..... Lb. | 315 | 315 | 105 | 105 |
| Per cent of butter-fat in milk. . ..... | 3·36 | 3·46 | 3·36 | 3·46 |
| do fat left in skim-milk..... . ..... | ·71 | ·73 | ·45 | ·47 |
| Quantity of fat in whole milk..... Lb. | 10·58 | 10·90 | 3·53 | 3·63 |
| do left in skim-milk . ..... " | 1.83 | 1·88 | ·39 | ·40 |
| Percentage unrecovered..... | 17·32 | 17.27 | 11·05 | 11·13 |

This experiment shows that the loss of unrecovered fat—left in the skim-milk—was 6·2 per cent greater, by the use of a milk-can 15 inches in diameter, than by the use of a deep-setting pail 8½ inches in diameter.

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*Experiments in the Churning of Cream.*

The first series of experiments was undertaken to discover what difference, if any, in the product of butter, resulted from the churning of cream obtained by the deep-setting method, from the milk of three groups of cows at different stages of

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lactation. The cows which composed the three groups were the same as those described in Tables V to IX, viz.:—

Group I contained cows which had been milking for periods ranging from 8 to 11 months.

Group II contained cows which had been milking for periods ranging from 5 to 7 months.

Group III contained cows which had been milking for periods ranging from 1 to 3 months.

THE FIRST TRIAL was made on 28th November. A portion of the milk of two days was used from the cows of each group.

The milk was set immediately after it reached the dairy building, at a temperature of 96° Fahr., in deep-setting pails, in ice-water of a temperature of 38° Fahr.

The setting period was 22 hours.

In each case 5 per cent of fermentation starter was added, and the cream of the three lots was ripened to as nearly the same stage of acidity as possible.

The ripening period in this trial was 12 hours.

Table XIII shows the result of the first trial of churning cream from the milk from each of the three groups.

TABLE XIII.

| | Milk from | | |
|---|---|---|---|
| | Group I. | Group II. | Group III. |
| Quantity of milk set..... Lb. | 121 | 138 | 248 |
| Per cent of butter-fat in milk..... | 4·3 | 4·1 | 3·1 |
| Creaming— | | | |
| Quantity of cream..... Lb. | 26 | 27 | 38 |
| Per cent of fat left in skim-milk..... | 1·20 | 1·00 | ·65 |
| Churning— | | | |
| Churning temperature..... Fahr. | 64° | 64° | 62° |
| Minutes churned..... | 150 | 100 | 40 |
| Revolutions of churn per minute..... | 65 | 65 | 66 |
| Quantity of butter obtained..... Lb. | 4·75 | 5·75 | 8·00 |
| do buttermilk..... " | 21 | 21 | 30 |
| Per cent of fat left in buttermilk..... | ·20 | ·30 | ·20 |
| Results— | | | |
| Quantity of fat in whole milk..... Lb. | 5·20 | 5·66 | 7·69 |
| do do left in skim-milk and buttermilk..... " | 1·18 | 1·17 | 1·42 |
| do of milk per lb. of butter..... " | 25·5 | 24· | 31· |
| Percentage of fat unrecovered..... | 22·69 | 20·67 | 18·46 |

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THE SECOND TRIAL was made on 30th November. A portion of the milk of two days was used from the cows of each group. The milk was re-heated to a temperature of 98° after it reached the dairy building, and was set immediately thereafter in deep-setting pails, in ice-water of a temperature of 38° Fahr.

The setting period was 22 hours.

In each case 5 per cent of fermentation starter was added, and the cream of the three lots was ripened to as nearly the same stage of acidity as possible.

The ripening period in this trial was 15 hours.

Table XIV shows the result of the second trial of churning cream from the milk from each of the three groups.

TABLE XIV.

| | Milk from | | |
|---|---|---|---|
| | Group I. | Group II. | Group III. |
| Quantity of milk set ..... Lb. | 114 | 137 | 279 |
| Per cent of butter-fat in milk..... | 4 | 4·1 | 3·1 |
| Creaming— | | | |
| Quantity of cream..... Lb. | 22 | 27 | 51 |
| Per cent of fat left in skim-milk ..... | 1·35 | 1·00 | 0·55 |
| Churning— | | | |
| Churning temperature..... Fahr. | 64° | 64° | 62° |
| Minutes churned..... | 180 | 100 | 50 |
| Revolutions of churn per minute ..... | 60 | 65 | 66 |
| Quantity of butter obtained..... Lb. | 4·12 | 5·25 | 9·75 |
| do buttermilk..... " | 17 | 21 | 41 |
| Per cent of fat left in buttermilk..... | ·45 | ·35 | ·30 |
| Results— | | | |
| Quantity of fat in whole milk..... Lb. | 4·56 | 5·62 | 8·65 |
| do left in skim-milk and buttermilk..... " | 1·31 | 1·17 | 1·37 |
| Quantity of milk per pound of butter..... " | 27·6 | 26·1 | 28·6 |
| Percentage of fat unrecovered..... | 28·73 | 20·82 | 15·84 |

THE THIRD TRIAL was made on 4th December. A portion of the milk of two days was used from the cows of each group. The milk was re-heated to a temperature of 95° after it reached the dairy building. To the milk from Groups I and II, 10 per cent of water was added, before it was set; the milk from Group III was delayed in setting for half an hour; it was re-heated to 98° and set without the addition of water. The three lots were set in deep-setting pails, in ice-water of a temperature of 38° Fahr. The setting period was 22 hours. In each case 5 per cent of fermentation starter was added to the cream, and each lot was ripened to as nearly the same stage of acidity as possible. The ripening period in this trial was 16 hours.

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Table XV shows the result of the third trial of churning the cream from the milk, from each of the three groups.

TABLE XV.

| | Milk from | | |
|---|---|---|---|
| | Group I. | Group II. | Group III. |
| Quantity of milk set.....Lb. | 116 | 121 | 308 |
| Per cent of butter-fat in milk.. | 3·6 | 3·8 | 3.8 |
| Creaming— | | | |
| Quantity of cream.....Lb. | 23 | 24 | 62 |
| Per cent of fat left in skim-milk | 1·60 | 1·30 | ·50 |
| Churning— | | | |
| Churning temperature.....Fahr. | 70° | 64° | 62° |
| Minutes churned | 49 | 85 | 49 |
| Revolutions of churn per minute | 65 | 65 | 66 |
| Quantity of butter obtained.....Lb. | 3·25 | 4·75 | 12·00 |
| Quantity of buttermilk.....“ | 19 | 19 | 50 |
| Per cent of fat left in buttermilk | ·35 | ·15 | ·20 |
| Results— | | | |
| Quantity of fat in whole milk.....Lb. | 4·18 | 4·60 | 11·70 |
| Quantity of fat left in skim-milk and buttermilk.....“ | 1.55 | 1.28 | 1·33 |
| Quantity of milk per lb. of butter.....“ | 31 | 25·5 | 25·6 |
| Percentage of fat unrecovered | 37·79 | 27·82 | 11·37 |

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Table XVI shows the length of time required for churning, and the percentage of butter-fat left in the buttermilk, from the three trials in each case.

TABLE XVI.

| No. of Trial..... | Group I. | | | Group II. | | | Group III. | | |
|---|---|---|---|---|---|---|---|---|---|
| | First. | Second. | Third. | First. | Second. | Third. | First. | Second. | Third. |
| Churning temperature, Fahr... | 64° | 64° | 70° | 64° | 64° | 64° | 62° | 62° | 62° |
| Minutes churned..... | 150 | 180 | 49 | 100 | 100 | 85 | 40 | 50 | 49 |
| Revolutions of churn per minute | 65 | 60 | 65 | 65 | 65 | 65 | 66 | 66 | 66 |
| Percentage of fat left in buttermilk ..... | ·20 | ·45 | ·35 | ·30 | ·35 | ·15 | ·20 | ·30 | ·20 |

The conclusions which were indicated by these churning experiments were:—

(1) That the cream from the milk of cows, which have been milking for periods of from five to eleven months, should be churned at a temperature of from 66° to 70° Fahr., in order to obtain butter in from one hour to three-quarters of one hour.

(2) That the loss of fat unrecovered from the buttermilk, was practically the same, viz., ·33, ·26, ·23 of 1 per cent of fat, left in the buttermilk, from Groups I, II and III, respectively.

(3) An examination of the butter showed a decided absence of rosy and delicate flavour in the butter obtained from the milk of cows which had been milking for longer than five months.

*The second series of experiments in the churning of cream* was made to determine the effect on the quantity of butter which could be obtained by churning cream at different stages of ripeness or acidity.

THE FIRST TRIAL was conducted on the 29th August; 120 lb. of cream were taken from 676 lb. of milk. The whole quantity of cream was mixed thoroughly, and afterwards divided into two equal lots. One lot was ripened by the addition of fermentation starter, and by being kept at a temperature of 64°; the other lot was cooled to 40° and kept sweet until the following day. Both lots were then divided into equal portions of 30 lb. each; 30 lb. of the sour ripened cream was then mixed with 30 lb. of the sweet cream, leaving three lots for churning, as shown in the following:—

Lot 1, sour cream..... 30 lb., sour, in churn No. 1.

Lot 2, sweet cream..... 30 lb. + 30 lb. mixed, in churn No. 2.

Lot 2, sweet cream..... 30 lb. sweet, in churn No. 3.

A SECOND TRIAL was made on the 10th September, when 120 lb. of cream were taken from 774 lb. of milk. The whole quantity of cream was treated in the manner which has been described in the first trial.

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The following Table shows the results from the two trials of churning cream at different stages of ripeness.

TABLE XVII.

| —— | First Trial. | | | Second Trial. | | |
|---|---|---|---|---|---|---|
| No. of churn..... | No. 1 | No. 2 | No. 3 | No. 1 | No. 2 | No. 3 |
| Daisy churn..... Size. | No. 2 | No. 5 | No. 2 | No. 2 | No. 5 | No. 2 |
| Quantity of milk..... Lb. | 169 | 338 | 169 | 194 | 387 | 194 |
| do cream..... " | 30 | 60 | 30 | 30 | 60 | 30 |
| Stage of ripeness..... | Sour. | Mixed. | Sweet. | Sour. | Mixed. | Sweet. |
| Churning temperature..... Fahr. | 59° | 60° | 60° | 62° | 62° | 62° |
| Minutes churned..... | 53 | 35 | 65 | 40 | 30 | 65 |
| Revolutions of churn per minute..... | 66 | 62 | 68 | 66 | 64 | 68 |
| Quantity of butter obtained..... Lb. | 6·5 | 12·7 | 6· | 7·25 | 13·75 | 6· |
| do milk per lb. of butter " | 26· | 26·6 | 28·1 | 26·7 | 28·1 | 32·3 |
| Per cent of fat left in buttermilk..... | ·20 | ·50 | 1·30 | ·15 | ·90 | 2·00 |

These trials showed:—

(1.) A longer churning period for the sweet cream than the sour; (the mixed cream was churned in shortest time, because the revolving barrel churn, size No. 5, was a larger size than No. 2);

(2.) 14·6 per cent more milk or cream of equal quality, required to yield each pound of butter, when the cream was churned sweet, than when it was churned sour;

(3.) The buttermilk from sweet cream to contain 1·65 per cent of fat, as compared with ·17 of 1 per cent of fat in the buttermilk from sour cream.

Other experiments on this matter are in progress.

### *Experiments on the Heating of Milk to 150° Fahr.*

The heating of milk and cream to the scalding point—150° Fahr.—has been undertaken in some places, to sterilize them for keeping qualities and for wholesomeness in table use. Cream has been sterilized also for the purpose of regulating the degree of acidity which would be developed in a given time by the addition of a percentage of fermentation starter of known strength or acidity. Before undertaking a series of trials in the sterilizing of milk and cream, for the purposes which have been mentioned, a few tests were made to discover the effect of scalding milk and cream to 150° Fahr., upon the quantity, odour and flavour of the butter.

THE FIRST TRIAL was made on 10th October. 350 lb. of milk were mixed, after which 190 lb. were heated to 150° Fahr. Both lots were then set in deep-setting pails, in ice-water of a temperature of 38° Fahr.

The setting period was 22 hours.

A SECOND TRIAL was made on 12th October, when 360 lb. of milk were used. The treatment was similar to that of the first trial.

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Table XVIII shows the results of heating milk to 150° Fahr., before setting in deep-setting pails in ice-water, from both trials.

TABLE XVIII.

| —— | First trial. | | Second trial. | |
|---|---|---|---|---|
| Quantity of milk set..... Lb. | 190 | 160 | 195 | 165 |
| Per cent of butter-fat in milk .... | 3·40 | 3·40 | 3·40 | 3·40 |
| Temperature when set..... Fahr. | 150° | 96° | 150° | 96° |
| Creaming— | | | | |
| Quantity of cream..... Lb. | 31 | 30 | 31·5 | 30 |
| Per cent of fat left in skim-milk..... | 1·00 | ·35 | ·90 | ·40 |
| Ripening cream— | | | | |
| Temperature..... Fahr. | 67° | 67° | 64° | 64° |
| Per cent of fermentation starter added.... | 10 | 10 | 5 | 5 |
| Ripening period..... Hrs. | 10 | 11 | 16 | 16 |
| Churning— | | | | |
| Churning temperature..... Fahr. | 64° | 64° | 64° | 64° |
| Minutes churned..... | 60 | 100 | 60 | 90 |
| Revolutions of churn per minute..... | 65 | 65 | 65 | 68 |
| Quantity of butter obtained..... Lb. | 5·75 | 5·50 | 5·80 | 5·75 |
| Per cent of fat left in buttermilk..... | ·15 | ·15 | ·3 | ·3 |
| Results— | | | | |
| Quantity of fat in whole milk..... Lb. | 6·46 | 5·44 | 6·63 | 5·61 |
| do do left in skim-milk and butter-milk..... " | 1·64 | ·49 | 1·55 | ·61 |
| do of milk per lb. of butter. ..... " | 33·4 | 29·1 | 33·6 | 29· |
| Percentage of fat unrecovered..... | 25·38 | 9·01 | 23·38 | 10·87 |

These two trials point to the conclusions:—

(1.) When the milk was heated to 150° Fahr., before being set in deep-setting pails, 4½ lb. or 15·5 per cent more of milk was required to yield each pound of butter, than when the milk was set at a temperature of 96° Fahr.

(2.) When the milk was heated to 150° Fahr., 14·4 per cent more of the fat in the whole milk was not recovered from the skim-milk and butter milk, than when the milk was set at 96° Fahr.

(3.) In both trials the butter from the milk, which was not heated to 150°, was decidedly better in flavour and odour than the other lots.

### *Experiments in the heating of Cream to 150° Fahr.*

The two trials in this experiment were conducted on 21st and 26th October. The main object was to discover the effect of scalding cream to a temperature of 150° Fahr., upon the odour and flavour, which are introduced into the milk and its products

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from the feeding of turnips to cows. The cows were fed lightly upon turnips at first; and at the time when the milk was obtained for the second trial they were consuming 90 lb. of turnips per head per day in their ration. That excessive quantity was fed to make the trial of a treatment for expelling the turnip odour and flavour more emphatic one way or the other.

For the First Trial the milk of two days, weighing 758 lb., was set each day at a temperature of 96° in deep-setting pails, in ice-water of a temperature of 38°. From the two days' milk 140 lb. of cream were obtained. That quantity was divided into two equal portions, one of which was heated to 150° Fahr.

For the Second Trial the milk of one day, weighing 387 lb., was set at a temperature of 96°, in deep-setting pails, in ice-water of a temperature of 38°. From the milk, 70 lb. of cream were obtained. That quantity was divided into two portions, one of which was heated to 150° Fahr.

Table XIX shows the details of treatment afterwards, and also the results in the quantity of the butter and the percentage of loss of the fat.

Table XIX.

| — | First trial. | | Second trial. | |
|---|---|---|---|---|
| Quantity of milk set....Lb. | 380 | 378 | 191 | 196 |
| Percentage of butter-fat in milk | 3·6 | 3·5 | 3·6 | 3·6 |
| Temperature when set....Fahr. | 96° | 96° | 96° | 96° |
| Creaming— | | | | |
| Quantity of cream....Lb. | 70 | 70 | 35 | 35 |
| Percentage of fat left in skim-milk | ·45 | ·55 | ·51 | ·60 |
| Cream heated to....Fahr. | 150° | 65° | 150° | 68° |
| Cream cooled to.... " | 50° | ..... | 50° | ..... |
| Ripening Cream— | | | | |
| Temperature....Fahr. | 65° | 65° | 65° | 68° |
| Percentage of fermentation starter added | 6 | 6 | 6 | 6 |
| Ripening period....Hours | 14 | 14 | 14 | 16 |
| Churning— | | | | |
| Churning temperature....Fahr. | 61° | 64° | 64° | 64° |
| Minutes churned | 35 | 40 | 45 | 50 |
| Revolutions of churn per minute | 65 | 66 | 66 | 66 |
| Quantity of butter obtained....Lb. | 14 | 1.35 | 7 | 7·2 |
| Percentage of fat left in buttermilk | ·4 | ·3 | ·1 | ·3 |
| Results— | | | | |
| Quantity of fat in whole milk....Lb. | 13·68 | 13·23 | 6·88 | 7·06 |
| Quantity of fat left in skim-milk and buttermilk.... " | ·78 | ·70 | ·86 | ·98 |
| Quantity of milk per lb. of butter.... " | 27·1 | 28· | 27·3 | 28· |
| Percentage of fat unrecovered | 13·01 | 12·85 | 12·5 | 13·88 |

These two trials point to the conclusions:—

(1.) When the cream was heated to 150° Fahr., before being ripened for churning, $\frac{8}{10}$ of 1 lb. less milk was required to yield each pound of butter than when the cream was not heated above 68° Fahr.



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(2.) The percentage of fat unrecovered from the buttermilk, was practically the same in both cases.

(3.) In both trials, the butter obtained from the cream, which was heated to 150° Fahr., had no flavour or odour of turnips, and was decidedly better in every respect than the other two lots.

(4.) In both trials, the butter obtained from the cream, which was not heated above 68° Fahr., had a distinct odour and flavour of turnips, the lot from the last trial on 26th October giving a particularly strong smell and taste of turnips.

(5.) In both trials, the butter obtained from the cream, which was heated to 150° Fahr., was excellent in flavour and grain. It was rated at 37 and 36 for flavour out of a possible 40 (perfection); and at 30 (perfection) for grain.

(6.) In both trials, the butter obtained from the cream, which was not heated above 68° Fahr., was rated lower than the other lots. The points awarded to it were:—flavour, 35 and 25, out of a possible 40 (perfection);—and grain, 30 and 29, out of a possible 30 (perfection).

NOTE.—The butter was re-examined in glass jars, on 8th March, 1892, when the previous judgment was confirmed.

*Disposal of Dairy Products.*

The record of the quantities of milk received at the experimental dairy building from May—when the work there commenced—until December, and the disposition which was made of the same, is submitted herewith.

Milk received at the dairy for experimental work:

| | Lb. |
|---|---|
| May | 12,795 |
| June | 11,522 |
| July | 10,428 |
| August | 7,502 |
| September | 7,352 |
| October | 11,322 |
| November | 8,936 |
| December | 6,501 |
| | 76,358 |

| | Lb. |
|---|---|
| Butter in lb. prints, sold at 22c. and 25c. per lb. | 1,939½ |
| Butter in tubs and experimental jars, sold | 321 |
| do do do on hand. | 210 |
| | 2,470½ |

| | Quarts. |
|---|---|
| Cream sold to residents on the farm at 20c. per quart. | 127½ |

| | Quarts. |
|---|---|
| Buttermilk sold at 2c. per quart | 404 |

The skim-milk and the remainder of the buttermilk were fed to calves and pigs.

| | Quarts. |
|---|---|
| Milk sold to residents on the farm at 4c. and 5c. per quart. | 6,634½ |

## PART IV.—FORTY-ACRE LOT.

In the spring of the year it was arranged that about 40 acres of land should be set apart for the particular object of growing feed for cattle, in order to ascertain and illustrate how many cattle could be fed for the whole year upon the product of that area. In many parts of Canada an impression has prevailed that farmers

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cannot keep or feed at a profit large herds of cattle unless they have large farms. In most instances the estimate is that six full-grown cattle, and an equal number of young growing stock, are as many as can be fed conveniently on the fodder and coarse grain crop of a farm of representative size, of say 55 acres of cleared land. As a matter of fact, the average number of horned cattle kept per farm is about four head of full grown animals, and an equal number of growing young stock. It appears to me that the numbers of cattle might be doubled, with increasing profit to the farmers, and decided gain to the fertility of the fields. A further extension and improvement in mixed farming, which will cause more cattle to be fed on fewer acres, is capable of great service to the whole agricultural interest of the Dominion. This experiment has been in progress for only six months of the year. The full report can be made with satisfaction only at the close of each twelve months. The following report of progress will show the areas of land under different crops, and the yields of each which were obtained. In a general way, it may be said that the yield of crops did not reach my anticipations. The corn crop was the lightest per acre which has been gathered for three years, and a disastrous hail storm on 13th August beat down the grain crops and battered the leaves of the corn to a very serious extent. The recurrence of an injury from that cause is unlikely in coming years, as it has been infrequent in past years. Continued rains during the harvest season caused further losses in the grain crops. Notwithstanding these drawbacks, the experience of the year points to the probability that 25 milch cows will be fed, wholly or nearly so, on the product of the 40-acre lot for eleven months. On 2nd July 25 cows were put in one herd, to be fed from its crops. The milk from them furnishes a supply for experimental dairy work; and feeding experiments are being conducted with them, on different rations, as described in Parts I and III of this report:—

TOTAL YIELD OF CROPS FROM 40-ACRE LOT.

*Ripened Crops.*

| | | Lb. of Straw. | Lb. of Grain. |
|---|---|---|---|
| 8 acres, mixed crop, as in Table I | | 26,454 | 13,245 |
| 3 acres | Golden Vine Pease | | 905 |
| | Goose Wheat | 1,003 | 437 |
| | Beardless Barley | 3,102 | 1,373 |
| | Banner Oats | 2,790 | 2,060 |
| 3 acres, in 5 plots of mixed crop, similar to plots 1 to 5 in Table I | | 10,442 | 4,345 |
| 14 | Totals | 43,791 | 22,365 |

*Root Crops.*

| | | Lb. |
|---|---|---|
| 1 acre, Carrots | | 26,785 |
| 1 acre, Mangels and Turnips | Mangels | 8,110 |
| | Turnips | 9,655 |
| 1 acre, Turnips | | 29,584 |
| 3 | Total | 74,134 |
| ½ acre, Cabbage and Kohl Rabi | | 15,296 |



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*Cured Fodder Crops.*

2 acres, Spring Rye, wilted 12 hours and put in silo, 14,080 lb.
Mixed crop, cereals, second cutting, 1,825 lb.
11½ acres, Corn, wilted on an average two days, and put in silo, 130 tons 1,750 lb.
(That is equal to 183 tons 450 lb., green weight.)
1 acre, Corn, stooked in field to cure, 11,940 lb., as weighed February, 1892.

14½

1½ acres, Corn, fed green to the cattle (from 7th August), with mixed crop.
4⅓ acres, pastured.
3⅔ acres, mixed crop, as in plots 1 to 5, fed green; nearly 1½ acres of this was used in erecting paddocks for the bulls, and the crop on it was partially spoiled by the traffic incident to the work.

The following Table and explanatory notes present the details of the different crops:—

*Ripened Crops.*

EIGHT ACRES MIXED CROPS.—The land had no manure applied for at least five years; it was cropped every year; it was ploughed in the fall of 1890; it was disc-harrowed twice in spring of 1891; the smoothing harrows were used on it twice. It was divided into eight plots, each one acre in size.

A different mixture of grain was sown on each plot.

TABLE I.

| | Number of Plot. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Mixture sown— | | | | | | | | |
| Goose Wheat..... Bush. | ½ | 1 | 1 | ..... | 1 | 1½ | ..... | ..... |
| Danish Chevalier Barley. " | ¾ | 1 | ..... | 1 | 1 | ..... | 1½ | ..... |
| Banner Oats ..... " | 1 | ..... | 1 | 1 | 1 | ..... | ..... | 1½ |
| Golden Vine Pease ..... " | ¾ | 1 | 1 | 1 | ..... | 1½ | 1¼ | 1½ |
| Flax ..... Lb. | 2 | 2 | 2 | 2 | 2 | ..... | ..... | ..... |
| Total per acre..... Bush. | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Date sown ..... | April 30 | April 30 | April 30 | April 30 | April 30 | April 30 | April 30 | April 30 |
| Came up..... | May 12 | May 12 | May 12 | May 12 | May 12 | May 12 | May 12 | May 12 |
| Date when ripe..... | Aug. 24 | Aug. 17 | Aug. 17 | Aug. 17 | Aug. 17 | Aug. 22 | Aug. 22 | Aug. 22 |
| do cut..... | do 20 | do 18 | do 17 | do 18 | do 17 | do 25 | do 25 | do 25 |
| Quantity of straw and grain.. Lb. | 4,945 | 4,860 | 4,975 | 5,180 | 4,864 | 5,175 | 4,870 | 4,830 |
| Grain from thresher ..... " | 1,728 | 1,595 | 1,518 | 1,795 | 1,808 | 1,871 | 1,435 | 1,495 |

NOTES.—The mixtures were all sown on 30th April, and came up on 12th May. Two pounds of flaxseed were sown with the mixtures on plots 1 to 5. It ripened, and was ground with the grain for the feeding of cattle. I think at least 3 pounds per acre will give better returns.

The crop from plot 6—wheat and pease—gave the largest yield of grain per acre. That mixture of grain is also the most valuable for feeding in combination with corn ensilage. The second largest yield of grain was on plot 5, from a crop of wheat, barley and oats. I do not recommend this mixture, as I consider that every mixture should contain either pease or vetches. These latter grains do not require to obtain their supply of nitrogen from the nitrates in the soil as the other grains of the mixture do.

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Owing to a severe hail storm on 13th August, and rains before and during harvest time, the crops on all the plots were very badly broken down and lodged. In consequence, a large percentage of grain was shelled on the field.

PLOT 1.—Mixture of wheat, barley, oats and pease; all ripened together fairly well, excepting the wheat, which was in the doughy state when the other grains were ripe; cut with the mower, because too badly lodged to be cut with the reaping machine.

PLOT 2.—Mixture of wheat, barley and pease; wheat in doughy state when other grains were ripe, 17th August; badly broken down and lodged; cut with mower.

PLOT 3.—Mixture of wheat, oats and pease; wheat in doughy state when other grains were ripe; badly lodged; cut with mower, 18th August.

PLOT 4.—Mixture of barley, oats and pease; badly lodged; cut with mower, 18th August.

PLOT 5.—Mixture of wheat, barley and oats; wheat in doughy state when other grains were ripe; cut 17th August.

PLOTS 6, 7 and 8.—Mixture of wheat and pease, barley and pease, and oats and pease; all badly lodged, and cut with the mower, 25th August.

THREE ACRES OF GRAIN.—The land, whereon were grown the pease, wheat and barley, was manured in the spring at the rate of from 18 to 20 tons to the acre; it was ploughed, and harrowed twice; part of the pease and wheat crops were taken in, and parts were injured by the enclosing of the bull paddocks which have been mentioned; part of the acre of barley was injured and part of the crop was killed by water standing on it; that was owing to unusually heavy rains and the failure of a drain to work efficiently; the land for the Banner oats adjoined plot 8, and received treatment similar to plots 1 to 8.

THREE ACRES OF MIXED CROP.—The soil was of a peaty character; it received a coating of manure at the rate of from 18 to 20 tons per acre; it was ploughed in spring, and harrowed twice; the mixtures were the same as on plots 1 to 5; they were sown on 9th May and came up on 16th May; parts from the ends of each plot were cut and fed green, as mentioned in the summary of the yield of crops; three acres were left to ripen.

*Root Crops.*

Three acres were prepared for sowing, one acre each of carrots, mangels and turnips. The land received a coating of manure at the rate of from 18 to 20 tons to the acre. It was ploughed in the spring, harrowed twice, and set up in drills 2½ feet apart.

CARROTS.—Five varieties were sown for comparison, but owing to the wet season, and water standing on part of the plot for several days, the crops were not grown under sufficiently uniform conditions to make any fair comparison of the yield per acre of the different varieties. "Steele's Improved Short White," "Giant Short White," or "White Vosges," "Green Top Orthe," "Improved Half-long White," and "Early Gem," or "Guerande," were the varieties which were sown.

NOTES.—Sown 13th May; came up 26th May; pulled 30th October. Total weight of the five varieties, 26,785 lb. from one acre.

MANGELS.—Five varieties were sown on 13th May and came up on 26th May. The names of the five varieties were "Pearce's Canadian Giant," "Golden Fleshed Tankard," Giant Yellow Intermediate," "Mammoth Yellow Intermediate," and "Giant Yellow Globe." From 10th June to 14th June cut-worms destroyed about two-thirds of the young plants. The spaces were sown with turnip seed on 15th June. The yield of mangels was 8,110 lb., and of turnips 9,655 lb. from one acre.

TURNIPS.—Five varieties of turnips were sown on 4th June. The names of the varieties were, "Improved Purple Top Mammoth," "Laidlaw's Improved," "Elephant Swede," "Hartley Bronze," and "Rennie's Prize Purple Top." They all came up 10th June. They were pulled 24th October. There was a large percentage of the turnips in one part of the plot diseased. The inside of the roots turned to a jelly-like mass, before there was any easily recognizable evidence on the outside

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that decay had set in. A similar disease prevailed in the turnips on other parts of the farm, and in the vicinity of Ottawa on other farms. The total yield of the five varieties was 29,584 lb. from one acre.

CABBAGE AND KOHL RABI.—Half an acre of the land, prepared in the same manner as for the roots, was sown with cabbages and kohl rabi. The cabbages were put in rows 3 feet apart, and the plants were left 2 feet apart in the rows. Four varieties were sown, viz.: "Early Drumhead," "Drumhead Savoy," "Giant Drumhead," and "Thousand Headed, or Kale." They were sown on 14th May and came up on 23rd May. Two-thirds of each variety were eaten by the turnip-flea beetle and cut-worms. The same varieties were sown in their place on 5th June and came up on 12th June. The kohl rabi suffered in a similar manner, and a re-sowing was made on 6th June. The second crop came up on 12th and 13th June. The total weight from the cabbage and kohl rabi was 15,296 lb. from half an acre.

*Cured Fodder Crops.*

TWO ACRES SPRING RYE.—The land received a dressing of manure, about 18 or 20 tons to the acre; it was ploughed in the spring and harrowed twice with smoothing harrow; sown 1st May; came up 11th May; cut 15th July. When the heads were filled with grain in the doughy or late milk state it was allowed to wilt in the field for twelve hours and then put into the silo; total weight, 7 tons 80 lb. (For remarks on rye ensilage, see report on silos.) The same land was ploughed 17th July, and sown with a mixture of Hungarian grass and millet; this second crop did not come to anything worth mentioning for feed.

FOURTEEN ACRES OF FODDER CORN.—Ten acres of the land were in one block; an oat crop had been taken off in 1890. In the spring of 1891 a dressing of manure, at the rate of about 18 tons to the acre, was given; it was ploughed under, and the land harrowed twice. The soil was very uneven in its character; a part of it was a mellow, sandy loam, with streaks and patches of clay soil of a whitish colour. These patches, in some cases, were 50 feet across; about two acres of it were of a peaty character, with interruptions of loam and patches of clay. Parts of the land had been a swamp four years ago, and portions of it had been burned during the clearing. For these reasons, the yields per acre in that portion of the block did not give results which could be relied upon as guiding to a knowledge of the best practice in planting or in selecting varieties.

FOUR AND ONE-HALF ACRES were devoted to the planting of the varieties of Red Cob, Pearce's Prolific, Longfellow and Thoroughbred White Flint, (1) at rates of 2, 4, 6 and 12 grains respectively to the lineal foot, in rows 3 feet apart, and (2) in rows 3, 4 and 5 feet apart, with about 3 grains to the foot, planted by a seed-drill.

The corn was planted on 23rd May, and was cut on 16th and 17th September. It was left to wilt in bunches on the field for an average of two days before being put into the silo. The total weight after wilting, from the 4½ acres, was 49 tons 1,740 lb. From a test made on another plot, corn was found to have lost 28·5 per cent in weight by wilting in small bunches in bright sunshiny weather for two days. At that rate of shrinkage, the green weight of corn on the 4½ acres would be calculated as 69¾ tons.

ONE ACRE of Red Cob and Longfellow was planted in rows 3 feet apart, two rows of each alternately, 18 lb. of seed per acre; cut 16th September; wilted two days; weight, 10 tons 785 lb.

ONE ACRE of Thoroughbred White Flint and Pearce's Prolific was planted in a similar way; cut 16th September; wilted two days; weighed 12 tons 350 lb.

ONE ACRE of Red Cob and Longfellow was planted in rows 3 feet apart, with the seed mixed before planting; 18 lb. of seed per acre; cut 14th September; wilted two days; weighed 11 tons 1,685 lb.

ONE ACRE of Thoroughbred White Flint and Pearce's Prolific was planted in a similar way; cut 14th September; wilted two days; weighed 11 tons 1,600 lb.

ONE ACRE of Thoroughbred White Flint and Longfellow was planted in a similar way; cut 14th September; wilted two days; weighed 10 tons 1,745 lb.

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HALF AN ACRE Red Cob (corn, 5 lb. and pease 5 lb.) was planted in rows 3 feet apart. The mixture was not a success; the corn was a good crop, but the pease came up too soon and did not use the corn stalks as a trellis. The crop was fed to the cattle green.

TWENTY FEET by width of block, 562 feet, Red Cob corn and pease, were sown by ordinary seed drill with spouts 7 inches apart; corn and pease in alternate drill rows; the corn was of a variety too late in maturing to be mixed with pease; a heavy crop was obtained; fed green; this mixture of corn and pease, in same order of sowing, promises to be useful in obtaining a more complete ration for cattle than corn is in itself.

FOUR ACRES sandy loam; size of the plot, 562 x 310 feet; of it, 562 x 210 feet received a dressing of manure, at the rate of about 18 tons per acre; ploughed in spring; harrowed three times; planted in four lots, one each of Red Cob, Thoroughbred White Flint, Pearce's Prolific, Thoroughbred White Flint and Longfellow; about one acre was fed green; the remainder was cut 18th September; wilted for two days and put into silo; the remainder was stooked in the field, to be used as dried and cured fodder corn.

The cutting of corn to be fed green to the cows commenced on 7th August.

Particulars and Tables, showing the comparative yields, stages of maturity, number of ears per 100 feet, and condition of the corn ensilage, will be found in Part V of this report.

Three and one-fifth acres of fall rye have been sown for feeding in the spring of 1892, and for use as ensilage during the early part of summer.

## PART V.—FODDER CORN AND THE SILOS.

It is not too much to say that no single subject closely related to successful agriculture is receiving so much attention from the agricultural press of Canada, or is creating so much discussion at conventions and meetings of farmers, as that of the growing of fodder corn and the making of ensilage. The economical feeding of cattle in stables, and the increasing of the number of cattle which are kept per farm, are matters peculiarly important to the farmers of Ontario and the provinces that lie eastward of it. The economic possibilities of fodder corn and the silo have been mentioned in connection with the fattening of steers for beef and the feeding of cows for milk, in Part II of this report. This brief chapter is presented for the purpose of indicating how the farmers in every district may obtain the largest service from this crop. No specific rule or direction will be found applicable to all soils, districts or seasons; but in all districts, in nearly all soils, and in every season, the corn crop will yield the farmers in the provinces which I have mentioned feeding material for their cattle during the winter, with more profit and advantage than any other single crop which can be grown with as little labour and exhaustion to the fertility of the land, and which can be saved in a cured condition as conveniently.

On one plot on the farm, 68 varieties of corn were planted in rows 3 feet apart—two rows of each—to a length of 90 feet. They were planted on the 21st of May and came up from 1st June to 4th June. They were all cut on 12th September. The average yield, weighed green, was 17 tons and 47 lb. per acre. Particulars on the comparison of varieties for one season only are apt to be rather misleading. Some of the varieties, which gave excellent results on the farm during the two previous years, and did equally well on other parts of the farm in 1891, did not turn out so well on this experimental plot; but, taking the plots on the whole farm, the results as published in Bulletin No. 12, prepared by Prof. Saunders, can be taken as agreeing with the results for the season of 1891. The following short extract is taken from that bulletin:—

"From the results given, it would appear that the Thoroughbred White Flint, Long White Flint, Long Yellow Flint, Yellow Dutton, Large White Flint, Pearce's Prolific and Longfellow, are the most productive of the Flint varieties, ranging in

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yield in the order named, and all of them, excepting the Long White Flint, attained a sufficient degree of maturity to make excellent ensilage.

"Among the different sorts of Dent corn, none of which, however, mature as well as the Flint varieties, the following have been found to yield the greatest weight of crop:—Virginia Horse-tooth, Golden Beauty, Golden Dent, Blunt's Prolific, Mammoth Southern Sweet and Red Cob Ensilage.

"Many sorts of sweet corn have given a large yield, the most prolific being Mammoth Sugar, Crosby, Eight-rowed Sugar, Egyptian Sugar and Asylum Sweet. The earliest ripening among these is the Crosby."

On a plot adjoining the one where the 68 varieties were planted, Thoroughbred White Flint was planted in hills 3 feet apart. Two rows of it of an equal length, from the hill method of cultivation, gave at the rate of 4 tons 250 lb. per acre larger yield than two rows under the drill method of cultivation, grown close by. It would not be prudent to base a general conclusion on the result of this one comparison. The method of cultivation in hills seems to permit of the formation of a larger number of ears on the stalks, and a rather earlier maturing of the crop.

From the corn which was grown on the 40-acre plot, already reported upon, some information bearing upon the comparative value of the crop of corn at different stages of maturity has been obtained. The stage of maturity reached has been recorded at the "tasselling," "silking," "early milk," "late milk" and "glazing" stages of growth.

The following Table illustrates the number of ears and nubbins, obtained from planting in rows 3 ft., 4 ft. and 5 ft. apart, with from 3 to 4 grains per lineal foot in the rows:—

TABLE I.

Number of Ears and Nubbins, in rows 100 feet long, on 15th September.

| Varieties. | Distance of Rows apart. | | | | | |
|---|---|---|---|---|---|---|
| | Three Feet. | | Four Feet. | | Five Feet. | |
| | Ears. | Nubbins. | Ears. | Nubbins. | Ears. | Nubbins. |
| Red Cob | 20 | 49 | 16 | 95 | 22 | 109 |
| Pearce's Prolific | 102 | 22 | 91 | 20 | 143 | 39 |
| Longfellow | 87 | 23 | 121 | 30 | 134 | 34 |
| Thoroughbred White Flint | 13 | 51 | 45 | 48 | 63 | 59 |
| Average | 50 | 36 | 68 | 48 | 90 | 60 |

While the rows 5 feet apart showed the largest number of ears and nubbins per lineal foot in the rows, the three different methods of planting gave nearly the same numbers each per acre.

Information on the comparative percentages of water, dry matter, yields per acre, dry matter per ton, and dry matter per acre, at the different stages of growth of the four varieties, "Longfellow," "Pearce's Prolific," "Thoroughbred White Flint," and "Red Cob," are found in the following Table:—

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TABLE II.

| Name of Variety. | Planted. | Tasselling. | Silking. | Early Milk. | Late Milk. | Glazing. |
|---|---|---|---|---|---|---|
| Longfellow..... ..... | May 23..... | Aug. 1 ... | Aug. 11.... | Aug. 27.... | Sept. 10.... | Sept. 21.... |
| Pearce's Prolific..... | do 23..... | do 3. . | do 13 . . | do 29.... | do 12.... | do 22.... |
| Thoroughbred White Flint | do 23..... | do 18.... | do 25.... | Sept. 22.... | Oct. 3.... | ..... |
| Red Cob..... | do 23..... | do 22.... | Sept. 2.... | Oct. 3.... | ..... .. | ..... |
| Per cent of water in green plants ..... | | 85·73 | 83·8 | 80·0 | 77·8 | 73·8 |
| do dry matter in green plants.. | | 14·27 | 16·17 | 19·95 | 22·14 | 26·18 |
| Yield per acre (green weight) ..... Lb. | | 45,329 | 48,052 | 45,866 | 42,759 | 43,154 |
| Dry matter, per ton of green corn.. do | | 285 | 323 | 399 | 443 | 524 |
| do per acre .. ..... do | | 6,468 | 7,770 | 9,138 | 9,467 | 11,298 |

These figures point to a very large increase in the weight of dry matter per acre as the corn approaches the ripe condition.

The analyses of these varieties of corn and the calculations have been made by Mr. F. T. Shutt, Chief Chemist. A more extended analysis of the corns will doubtless appear in his Report for 1891 or 1892.

Corn of the same four varieties was also grown under a method of cultivation with from three to four grains to the lineal foot, in rows of 3 feet, 4 feet and 5 feet apart, respectively, in each case. The following Table shows the average yields per acre which were obtained from the different methods of planting :—

TABLE III.

Weights of four varieties of Indian Corn sown in rows 562 feet long. Four rows of each variety were sown at the distances of 3 feet, 4 feet and 5 feet apart, respectively.

The corn was wilted two days before weighing.

| Varieties. | Distance of Rows apart. | | |
|---|---|---|---|
| | 3 feet. | 4 feet. | 5 feet. |
| | Lb. | Lb. | Lb. |
| Red Cob ..... ..... ..... ..... | 2,970 | 5,330 | 5,305 |
| Pearce's Prolific ..... ..... .. .... ..... ..... | 2,568 | 2,800 | 4,470 |
| Longfellow. ..... ..... ... ... | 2,464 | 3,430 | 4,110 |
| Thoroughbred White Flint..... ..... ..... | 3,058 | 4,270 | 5,190 |
| Average per acre..... .... ..... ..... | 17,857 | 19,154 | 18,479 |

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Taking into account the convenience of cultivation, the keeping down of weeds, and the quality of the stalks, it appears that the best results are obtained from planting in rows 3 feet or 3½ feet apart, or, better still, in hills 3 feet apart each way.

The same four varieties of corn were also planted in rows 3 feet apart, at the rates of 2, 4, 6 and 12 grains per lineal foot in each row. The land on which they were grown was so irregular in character that no fair comparison of the yields that may be obtained per acre from these different methods of planting could be made. A brief report of the quality of the ensilage from these methods of planting the corn will be made.

These four varieties of corn were also planted in different combinations (1) two rows of each alternately, and (2) two of the varieties mixed in each row. The following Table shows the results obtained from these investigations:—

TABLE IV.

| Method. | Varieties. | Stage of Growth. | Weight per Acre, wilted. | Green Weight per Acre. (Calculated) |
|---|---|---|---|---|
| | | | Lb. | Lb. |
| Two rows alternately..... | Red Cob.. ..... Longfellow . ..... | Silking..... Late milk..... | 20,785 | 29,099 |
| Two rows alternately..... | Thoroughbred White Flint.. Pearce's Prolific..... | Early milk.. ... Late milk.... . | 24,350 | 34,090 |
| Seed mixed before planting... | Red Cob..... ..... Longfellow ..... ..... | Silking..... ... Late milk..... . | 23,685 | 33,159 |
| do do ... | Thoroughbred White Flint... Pearce's Prolific..... | Early milk..... Late milk... . | 23,600 | 33,040 |
| do do ... | Thoroughbred White Flint .. Longfellow ..... .... | Early milk.... . Late milk... .. | 21,745 | 30,443 |

These five acres were all planted on 23rd May, cut on 12th September, and wilted for two days. The green weights per acre would be about 40 per cent more than the wilted weights.

There does not appear to be any advantage from the planting of different varieties in alternate rows, nor from the mixing of varieties in the same rows.

The heaviest yield on a single acre of corn was one acre of Thoroughbred White Flint, which weighed, after two and a-half days' wilting, 12 tons 900 lb.

*Condition of Ensilage.*

In silo No. 1 there were 116 tons and 1,259 lb. of mixed varieties, odd plots, and Thoroughbred White Flint. The silo was opened on 10th October. It had been covered with a layer of straw to a depth of about 18 inches. On the top it was spoiled to a depth of about 2 inches, and there was of spoiled and mouldy ensilage 3,333 pounds. The total weight of waste ensilage from this silo, besides that found on the top, was 100 pounds. The corn for this silo was cut in lengths fully 1 inch long. The cattle refused to eat portions of the larger stalks, and also portions of the cobs.

In silo No. 2 there were 95 tons 1,135 lb. It also was covered with a layer of straw. There was spoiled and mouldy ensilage on top for a depth of 2 inches, which weighed 2,694 pounds. The surface area in both silos was 18 feet x 16 feet. Different

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lots of corn, according to the method of planting under which they were grown, were put in separate layers. They were divided from each otherby a layer of uncut corn stalks.

The first layer was one of ensilage from Red Cob corn, grown in rows 3 feet, 4 feet and 5 feet apart It had barely reached the " early milk " stage when cut. The sample was in only medium condition as to preservation.

The next layer was that of the four varieties of corn planted in rows 3 feet apart, with 12 grains to the lineal foot in each row. It had been allowed to wilt in the field until it had become rather dry. When it was taken from the silo it was in fairly good condition, but so dry that the meal of the ration would not adhere to it.

The next layer of ensilage was from the four varieties of corn planted in rows 3 feet apart, with 6 grains to the lineal foot in each row. This layer was found to be in an excellent condition as to preservation, but was rather dry from too much wilting.

The fourth layer of corn in this silo was from four varieties of corn planted in rows 3 feet apart, with 4 grains to the lineal foot. The ensilage was in an excellent state of preservation, and was not quite so dry in condition as the two layers above it. This silo was then closed for several weeks. Before this writing (February) it has been reopened. On the top was found a layer of mouldy ensilage, which weighed 2,840 pounds.

The fifth layer of the silo was from the corn of four varieties, planted in rows 3 feet apart, with 2 grains to the lineal foot in each row. This sample was of better quality, and in better condition as to preservation, than the ensilage from the same varieties of corn, planted with 4, 6 and 12 grains to the lineal foot in each row, respectively. The contents of silo No. 2 are being fed at this writing.

Silo No. 3 was constructed on the barn floor. Like the other silos, it is lined inside with two plies of lumber with paper between. The ensilage in it also was covered with straw; and there was of spoiled ensilage on the top a weight of 2,130 pounds. Its area is 15 feet by 15 feet. In a comparison between the condition of the ensilage in this silo, from the three varieties of corn, each grown in rows 3 feet apart, 4 feet apart and 5 feet apart, that from the corn grown in rows 4 feet and 5 feet apart, respectively, was found to be in the best condition. That appeared to be attributable to the fact that the stalks were rather more matured, and, as shown in Table I, carried a larger number of ears each. This silo is located over the stable, on a stout, 3-inch plank floor. A considerable quantity of ensilage was spoiled in the bottom of the silo.

Ensilage from Mixed Crops.—Some ensilage was made from a crop of mixed grain (oats, barley and peas)—grown in the summer of 1890. It was put into the bottom of the silo, and about 100 tons of green corn were put on top of it. After the corn was fed, the mixed crop ensilage came out in most excellent condition, and was fed to the cattle and calves as late as May and June.

Pease Ensilage.—In the autumn of 1890 part of a crop of pease was cut, when the pods were filled but not ripe, and put into the silo, to determine the value of such ensilage for the feeding of young pigs. The results are recorded in Table 2, in Part II of this report. The pease ensilage was fairly well preserved; but it gave off a very strong smell of ammonia whenever the surface was disturbed.

Rye Ensilage.—A crop of rye from two acres, weighing 7 tons 80 pounds, was put into the silo on 16th July, 1891. Feeding was commenced immediately. It had been allowed to ripen and wilt rather too much; in consequence, a portion of it became quite dry, and was not relished by the cattle. For the making of rye ensilage, the crop should be cut decidedly on the green side, and put into the silo without very much wilting.

Clover Ensilage.—A quantity of second crop clover was cut and put into the silo. It was put into the silo without being run through a cutting-box; in consequence, it packed rather loosely and unevenly, with holes and spaces in places. These became slightly mouldy. The bulk of the clover, however, is well preserved and is relished by the cattle.

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CONCLUSIONS.—In the making of ensilage from mixed crops, rye or clover, it is desirable to put the crops into the silo in a green and succulent condition. They should be run through a cutting-box, to provide for even distribution and close packing. They must be weighted heavily, either by the application of artificial pressure, or by being put into the bottom of a silo, which will be filled shortly afterwards with corn ensilage. The interstitial spaces between the fine stalks of such crops as oats, pease, rye, clover and grass, hold sufficient air to cause them to mould or decay, unless pressure be applied to expel it. The silo offers a convenient place for the saving of such crops, when the weather is unfavourable, but the lighter yield which can be obtained of them per acre hinders them from being as profitable to grow for ensilage as a crop of corn, wherever that can be grown to the "late milk" or "glazing" stage of maturity.

The experience of the season points to the following conclusions in regard to the growth of corn, the construction of silos, and the filling of the same:

SOIL.—If a field with a loose, warm, loamy soil be convenient to the silo, and can be used, it should be selected in preference to heavy clay, or cold soils. Sod may be ploughed under, shortly before the crop is planted, with the probability of good results from that method of preparation. In all cases, the land should receive a liberal dressing of barnyard manure, be ploughed in the spring, and be harrowed to a state of fine tilth before the corn is planted.

SEED.—The vitality and vigour of growth of the variety of corn which has been selected should be tested. The putting of a few grains in a flower pot in a warm place in the house will enable any farmer to verify for himself these qualities in his seed grain. Frequent disappointment results from neglect in testing the vitality of corn before planting it. As a general rule, the variety which will yield the largest weight per acre, and reach the "glazing" stage of maturity before the frosts come, is the one to select for any district. The "glazing" stage may be otherwise described as the stage when the corn is just past its best condition for boiling in the ear for table use. It is better to err on the side of selecting a variety of a habit of small growth, which certainly will reach the glazing stage, than a variety of large growing habits, which may not come to the desired stage of maturity.

The maximum quantity of seed per acre may be put at 25 pounds; excellent results have been obtained from the planting of 18 to 20 pounds per acre.

MANNER OF PLANTING.—Planting in hills, 3 feet apart, both ways, appears to afford the corn a better chance for maturing early, and for producing a large number of ears. A hand corn-planter may be used to dibble in the corn. From 4 to 6 grains per hill should be planted. Corn may also be planted by the use of a hoe, and covered to a depth of at least 2 inches. In that case the foot should be pressed on the soil over the corn. For small areas, furrows 3 inches deep may be ploughed 3 feet apart. A marker (which may be constructed by driving wooden pins or harrow-teeth through a plank at distances of 3 feet from each other), may be drawn across the furrows. From 4 to 6 grains may be dropped at the points of intersection. They can be covered quickly and well by the planter's foot. For large areas, a single or double horse corn-planter may be used with advantage. The planting of corn in hills affords an opportunity for the effective cleaning of land from weeds, without much hand labour, by permitting cultivation in both directions.

If planted in rows, the rows should be from 3 to 3½ feet apart, and the grains may be put in at rates of 3 to 4 grains per lineal foot. For small plots, a convenient method is to open a furrow with a plough; the seed may be dropped in at the rate already mentioned, when it may be covered. For large areas, a single or double corn-planter will be found a serviceable implement.

DEPTH.—Corn seed should be planted to a depth of from 2 to 3 inches.

CULTIVATION.—In cases where a crust forms on the land, before or immediately after the corn comes through, a light harrowing will prove very helpful to the vigour and growth of the crop. Harrowing of the corn until it is 6 inches high will increase the rapidity of growth and the yield per acre. The cultivation between the rows, when the plants are small, should be close to them, and deep. When the

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plants have grown to a height of more than 3 feet the cultivation should be more distant and shallow, in order to avoid injuring the side roots of the plants.

Silos.—The main features that are required in a silo are strength to resist the outward pressure of its contents, exclusion of air by the construction of the sides, and a fair depth of holding capacity, in order to permit the ensilage to settle into a compact mass. Sufficient strength of sides can be obtained in most silos by the use of 2 x 10-inch or 2 x 12-inch studs, placed from 18 inches to 2 feet apart. A clay or earthen floor is most economical, and as good as any that can be put in. The inside of the walls of the silo may be finished by a single lining of lumber, nailed to the studs horizontally. The lumber should be tongued and grooved and dressed on the inside. If each alternate board be allowed to extend at the corners, so as to make a lock-joint, that will give additional strength to the structure. The corners of the silo, on the inside, should be filled by the use of a board or plank 10 inches wide, set on end. The triangular space behind it should be filled with sand or sawdust. I consider that studs 2 x 10-inch or 2 x 12-inch, with one ply of sound tongued and grooved lumber, nailed horizontally on the inside, are sufficient for an efficient preservation of the ensilage. Additions to that method of construction may be advantageous, in a few cases, for convenience. If a portion of the ensilage around the sides becomes frozen, that is more an inconvenience than a loss. It should be mixed with the warm ensilage, from the middle of the silo, before it is offered or fed to the cattle.

Cutting the Corn.—The cutting of fodder corn by hand has been found the most economical of the methods which we have tried. If the crop be allowed to wilt in the fields, until it loses from 15 to 20 per cent of its moisture, a pleasant aromatic odour will be developed, which leaves the ensilage with a more agreeable smell. From an examination which was conducted with two tons of corn, left to wilt in the fields, in small heaps of about twenty-five or thirty stalks each, it was found that, with two days' exposure during bright sunshiny weather, the corn lost 28·5 per cent of its weight; and with four days' exposure, 36·8 per cent. After twenty-eight days standing in "stooks" it had lost 52 per cent; and after five months it had lost 58·8 per cent of its original green weight.

Filling the Silo.—It is advantageous to cut into the silo those varieties of corn which have thick stalks, in lengths of from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch. Cut into such lengths there is no waste, and the stalks and cobs are all eaten up clean by the animals. Provision should be made for a fairly even distribution of the corn in the silo, while it is being filled, and for tramping the sides and corners most thoroughly. The weighting of the corn does not appear to be necessary or advantageous. After the silo is filled the surface should be levelled and thoroughly tramped; and after the lapse of *not more than one day* it should be covered to a depth of 6 inches with cut straw. If a foot of cut straw be put on top of that a few days later, probably no loss at all from waste ensilage will be found on the opening of the silo for feeding. The feeding should be effected from the top of the ensilage, and a quantity of the exposed ensilage should be raked from the top daily.

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## PART VI.—LECTURES AND ADDRESSES.

### (1.) THE ECONOMICAL PRODUCTION OF BUTTER.

*(Report of an Address delivered before the Annual Convention of the Ontario Creameries' Association at Brockville, Ont.)*

Prof. Robertson said:—I find that these conventions are very great helps to me in my work. I find that it would be impossible for me to do the work that is expected of me, if I could not very often meet farmers in convention assembled, to discuss and learn from them their difficulties, as well as their successes. I think of the excellence of many of our farm products—our horses and our sheep, our cattle and our swine, our cheese and our butter, our wheat and our barley, and all those many things which we have in super-excellence in this country; and then I go back through the materials and products, and processes, and back through all the agencies, to find the real original cause of excellence. I find it in somebody's clear thinking, and in some thinker, who has solved some of the difficult problems of agriculture, and helped other men to use all the forces of nature for their service and good. Now, any one who thinks towards expression in painting, in music, in sculpture, in business, in war, in farming, has to work through agencies and by means of instruments. When a man takes hold of any task in the world, he requires some agent or agency, subordinate to and controllable by his thought, wherewith to effect any change for the better or the worse. And so if a speech or meeting will nourish the power of thought, and make it stronger and brighter and better, the farmer—every man—will be helped thereby. So far as a convention helps a farmer to be a better thinker towards expression in work and words, so far is it of service to him. You may load a man with information until he is so tired, that he will be nearly always tiresome to everybody else; but if you will help a man to think clearly, and then help him to think towards expression, he will bring thought to his work and do the world's work with head and hands. I have read somewhere a quotation from a very ancient author, written a long time before the birth of Christ, in which it is said: "To labour, the gods give all good things." That is a truth which holds good to-day. Every man in labouring should have first a clear comprehension of the object he seeks to obtain. Up in the garret of my house there is a very barely equipped carpenter shop. I never "waste" any time there, sharpening a chisel; I may spend some time in that way. I have heard a farmer say, "Oh, I could not waste a day in going to a convention." As the rubbing on a hone sharpens my chisel, so friction of minds in a convention, brightens thought and sharpens intellect. "As iron sharpeneth iron, so does the face of a man that of his friend," in friendly discussion of their common interests. The least serviceable of all tools is a dull mind and man. A plough does not create soil, neither does a cultivator; but these stir the soil up, and by stirring, they make it more fertile. A man's mind becomes fertile in great deeds, from educational contact with his fellows. Otherwise, it lies fallow, and fallow fields give a great crop of weeds, but never a great crop of grain until stirred up and sown with good seed.

I have put myself down to-night to speak on a most matter-of-fact subject—the economical production of butter. To some of you it will seem rather tedious, to have to endure such a subject, when you came for fun. I find that a great many men think butter-making to be a dreary, dreary, dreary, dirty occupation:—I mean the men who do the hard work of the farms. Let me show you the reason for dreariness of life on some farms. The farmer lacks information; he works in a wrong way, and works hard; he lacks confidence in his fellow-farmers and becomes suspicious; he stays isolated, and fails to reap the advantages of co-operation and mutual exchange of opinions and knowledge; he finds it hard to make a living and to make ends meet; and he listens to the harangues of the discontented who tell him that everybody's hand, head and heart are against him. Then he goeth about—in his mind—seeking some one to devour, instead of building up his own fortunes and

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happiness and those of others, by turning his thought towards construction and production,—the economical production of butter. If a man has enthusiasm in his tasks, he will find them easier and more remunerative; and, if I could inspire any man or any boy with enthusiasm and confidence in the capabilities of his own business, and give him a chance and desire to spend his best powers with advantage to himself, he would have new hope in himself and for his country. Where you find a man who is enthusiastic, you will seldom find a grumbler. I never heard a man enthusiastic about his business, who complained about it. He is too busy trying to remedy the defects and improve its opportunities, to waste his time or strength complaining. I think the butter-makers who are always complaining and blaming something lying outside of the environments of their own business, for their future might very well improve the dairy industry, by going to the land flowing with milk and honey. Such men would be ashamed to live, if they were not afraid to die.

There is nothing sordid in economy. The economical production of anything, is the result of the application of the best skill to its manufacture. Men sometimes sneer at economy, because they think it has an element of meanness in it. I know men so mean that they will clasp both hands over two cents, and grip them so hard and continuously, that their fingers will be too numb to scatter the seed in spring time to get a good crop for harvest. There must first be a giving out, a liberal sowing, before there can be an abundant harvest for reaping with joy. It is economical to sow bountifully when the seed and the soil are good. Again, a farmer says: "I do not count for much anyway." True, alone he does not count for very much,—any more than any of us do. As an illustration of this truth I think of the littlest things in all the world, of which my mind can gain the least glimmer of intelligent conception. I think of a boy blowing soap bubbles. I watch one of them as it floats off in the air, with its beautiful rainbow colours, chasing each other in seeming frolic across its film. Then the film bursts, and I observe to see if I can perceive the tiny drop of water that composed the extended film. I fail; it eludes my eye,—there was so little of it. Then I think of the tiny molecules of water that make up its form, and wonder how small they must be. I think it is the great Tyndall who helps us out with this illustration:—If you take a soap-bubble and have it magnified to such tremendous tenuity that it would make a jacket for the whole earth, and then in imagination stand off and look at its surface, you see its component parts, apparently as large as number six shot. If you want an illustration of the might of these wee things, when moving in concerted action, go and look upon Niagara. The infinitesimally little molecules of water run up on the slender rays of warm sunshine—which beneficently and in spite of man's ignorance, apathy and error, are making the earth better and brighter. They float away in clouds, return again to the earth in rain, trickle down the hillsides, rush in torrents through valleys, run gleefully along the river beds, flow with imperceptible progress across the wide lakes, and then tumble in irresistible might over the precipice of Niagara. In their isolation, only molecules of water in all their single insignificance! in united movement, Niagara in its sublimity and unlimited power for service! Niagara's power to-day represents more than all the horse-power of all the engines of all sorts in use on the continent. When it is harnessed by man's intelligence, it may furnish driving power for much of the machinery of America. When the farmers are united in their efforts and directed by benevolent intelligence, they will not only continue to furnish humanity with most of its working power, but they will gain for themselves a just appreciation and recognition of the worth of the farmers and the farmers' work, in elevating the manhood of the race.

Now, in the production of butter it is always economical to recognize, that economy takes cognizance of a man's environment. We can grow oranges in Canada; we have an orange tree bearing oranges to-day in Ottawa, but it is in a conservatory. We cannot grow oranges economically in this climate. Many men try to go on doing something regardless of the natural conditions that they find around them. Now, we have in Ontario the conditions for an economical production of butter. We have first of all a fertile soil—a soil rich in all the elements of plant

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food. We have a soil which gives the largest crops of forage plants in the world, with conditions to support all animal life in robust health. We have a capable people needing occupation, needing employment. Why should a man, living in Ontario, want to go off to Manitoba, or elsewhere, to get more room to spread himself on a great big farm? The money to-day is being made on small farms, by men who farm well and not by men who spread themselves over great areas, and farm poorly. We have markets calling out for fine butter all the time; and making butter will enable farmers to keep their land in good condition and give them and their families profitable employment. It is economy for the Government, for the people, to do all they can to extend the economical production of butter.

I need only stay a moment to say this, that the changing conditions of the markets require that a man should use his judgment, so as to meet these changes with an article that will meet the preferences of consumers. We are not responsible for having brought about many or any of the changes in the markets of the world and their competitions. I can go back very well and recall when the sending of the two large baskets of butter to the village store-keeper, affected the price, perhaps a penny a pound; and now we find within a few miles of that same spot, butter from New Zealand, from Ontario, from France, and from Denmark, all converging to and competing in the one market. We did not make the change, but the improvement and enlargement in the carrying facilities of the world, have made competitors of producers and countries far apart. These things have reduced the influence of the individual producer on the market to a very minimum. Therefore, it is a time for serious lamentation—for clothing ourselves in sackcloth and ashes, and blaming everybody but ourselves. But while we cannot control the marketing end of our business, which has been taken from us by the progress of civilization, the other end of it has come more and more within our jurisdiction and control. Better methods and more knowledge, have made it possible for us to reduce the cost of everything we sell; and, if we can control the cost, we can control the profit better than before. So it will always pay, to give special attention to the home-end of the business in the economical manufacturing of butter.

To do this requires the study of a few things. The people of the United States never did Canada so much small service as when they enacted the McKinley Bill, and put an almost prohibitory duty on hay. Farmers in the Province of Quebec this year, have to go over to the neighbouring counties to buy cows, and through their produce of butter and cheese, they will get more than they could have got by the sale of the primitive and raw material.

The following table shows the comparative exhaustion of the fertility of soil by the sale of one ton each of the different products which it enumerates:—

| Article. | Nitrogen. | Phosphoric acid. | Potash. |
|---|---|---|---|
| | lb. | lb. | lb. |
| Wheat | 41·6 | 15·8 | 10·4 |
| Barley | 32 | 15·4 | 9 |
| Oats | 38·4 | 12·4 | 8·8 |
| Pease | 70·6 | 17·2 | 19·6 |
| Beans | 81·6 | 23·8 | 26·2 |
| Indian Corn | 32 | 11·8 | 7·4 |
| Hay | 31 | 8·2 | 26·4 |
| Clover | 39·4 | 11·2 | 36·8 |
| Potatoes | 6·8 | 3·2 | 11·4 |
| Fat Cattle (alive) | 50 | 31·2 | 2·8 |
| Fat Sheep do | 44 | 22·6 | 2·8 |
| Fat Swine do | 34·8 | 14·6 | 2 |
| Cheese | 90 | 23 | 5 |
| Milk | 10·2 | 3·4 | 3 |
| Fine Butter | ·5 | 0 | 0 |

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It pays to concentrate the products of the soil and sell the refined products that carry the highest value with the least exhaustion of fertility. It is a fact that in one ton of hay you will sell 87 times more from the soil than you will in one ton of finest butter, and you will get for the hay probably $10 and for the butter $450.

Then, in the economical production of butter it will always pay a farmer to remember that butter is merely a kind of food whereby a man obtains energy for work. If I move my arm I rub off some of the material of my muscles—the friction has worn some off. I need something in my food to repair the waste of tissues in my body; besides, I need a supply of energy that will make it possible for me to originate and continue motions and perform the functions of living. There is nothing in fuel that will repair the waste of the cylinder of an engine, but without the fuel you could not get the motion. What does that mean? You get all energy in all food and fuel from the old sun. He streams his rays down on the earth and on and into the plants, which the soil carries. He rolls his strength up into plants, as I might wind my strength into the spring of my watch. A plant may then become food and fuel. It is economical practice on the part of the farmer to elect for his fields the plants which can serve him best in that capacity. The sun can store more of his energy during a single season's growth into the corn plant than into any other plant that grows easily in Canada. A corn stalk furnishes to the cows more energy than any other plant. Then you get this energy transmuted into butter, and you have "materialized sunshine," energy to supply force for your work. There is economy in that method of getting the sun to serve you by means of cornstalks, cows and butter. For this reason I think that every man who helps to make a farmer have increased faith in the value of cornstalks does a service to his country. The wealth of the Western States has come practically from two sources—from the sun and from the minerals—from the sun through the cornstalks, which in various forms of derivative diet has furnished the energy to dig up the minerals. You need not try to "bamboozle" yourselves into thinking that wealth comes into existence without somebody's effort.

Then, in the production of excellent butter, the farmer needs to have good cows. I have a great deal of respect for a good cow. I have a good deal more respect for some of the cows in my stable than I have for some men. If you will treat a cow properly she will give back an equivalent for what she gets. She is, therefore, honest and will pay for her way through life. I will hunt with a microscope in the careers of some men to see what they have given to the world of valuable service and I cannot find it. A cow sometimes does get more than she gives. I would not spare that cow. Put her on the block; get your money out of her in that way. You think of cows as boarders, kept for the profit of the man who keeps the boarding-house. Did you ever think of a man keeping a boarding-house, running on the general satisfaction plan, saying that if he does not get enough from one boarder to pay for his keep he will get it from the others? No; he expects to make a profit on each one of them. The farmer should act in that way towards the cows. There is advantage from watching the cows and selecting the best of them. It is not so very hard to do, and most cows are capable of paying for their board in full, if they are given a fair chance. But, if they are brought up the wrong way, they are sure to go astray—just like boys.

Some people have a preference for a large cow. To my mind, if I wanted a cow to consume more food than she will give a return for, I would like an immense animal. If I wanted her to pay for her board, I would just as soon have a small one. I believe I would rather have a small cow than a large one, if she will give the same quantity and value in her milk. Then there is a notion that the bigger the cow, the better the quality of her milk. This is not so. I have faith in the quality of goods done up in small packages.

I want to tell you what selection has done. The Hon. Thomas Ballantyne—a man who has done more to advance the dairying interests of Western Ontario than any single individual I know—spoke lately in my hearing, and he stated that one cow in his herd last year gave 12,000 pounds of milk; another gave 11,000 pounds



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in the season. They furnished milk for cheese-making during the summer, and for butter through the winter.

It is possible for a farmer, by judicious selection and feeding, to enlarge the capacity of the cows in his herd. Mr. George Allan, who lives near Ottawa, is an excellent farmer. He had four cows in 1888, which gave only 78 pounds of butter each. He began to grow cornstalks, and feed these with a little bran, and in 1889 they gave 131 pounds each, and in 1890 his cows gave him 204½ pounds of butter each. See the enlargement of capacity, and therefore an economical production. It is possible to enlarge the capacity of the cow and thus reduce the cost of production. That belongs to economy, and the wise man is economical always, because to be otherwise is waste; and waste is worse than folly.

Economy in the production of butter involves doing something during the long winter season. I know very few men who get all they want to get by working five months in the year. Most of us have to work twelve months of the year. I would have my cow work as long as I have to work myself. If you make a heifer with her first calf milk ten months, you create the tendency in her to keep that up, and in a short time you will have established a habit which will be transmitted to the progeny. I will find you herds of cows where they do not go dry at all. You may take these few facts away with you, that if the cow begins the milking season in the fall of the year, instead of the spring, she will soon give 30 per cent more milk within the twelve months; she will give you milk during the winter, when it is worth, on an average, 50 per cent more money; (and by the closest kind of calculation, it does not require more than 25 per cent more food to keep her milking than dry, if kept in proper condition in both cases); it will make it possible to keep a larger number of cows on the same farms. Cows milking through the winter will provide a great deal of skim-milk, for the raising of better calves, which means richer fields and more prosperity all around.

I have a great deal of faith in the capabilities of winter dairying in creameries, to furnish means wherewith to banish almost every economic evil of which the farmers complain. I have no faith in this practice, or any other practice, to bring economic salvation, except by the action of the farmers themselves. I have no faith in their industry being propped up. I have faith in their building it up, together with the prosperity of this country, and thus working out their own betterment of circumstances.

Sometimes people say to me, "If everybody went into this industry of winter dairying, where would the profit come from"? Well, a great many people, who do not want to do what is right, excuse themselves by thinking that they would strive to enter by "the straight gate" and walk in "the narrow way"—but they are afraid of making a crowd and keeping somebody out. You will never find any way to real success but the narrow way. The best way is always the narrow way. I do not care what line you are trying to follow up; and, because it is narrow, it will never be crowded—not because of lack of room at the gate to get in, but because of lack of heart and courage, and continuity of purpose and effort.

I have spoken quite long enough on the economical production of butter from the farmer's standpoint, without saying a single word about the manufacturing process. However, I will say a few words about that now. It is never economical to produce poor butter. A pound of butter which will not fetch more than 11 cents has cost somebody just as much as a pound of butter which will sell for 25 cents. It is always economical to help the cow to produce a large quantity of butter fat in her milk, because five-sixths of the butter is fat, and one-sixth water and curd. Now you will not forget that the elaboration of milk by the cow is a most mysterious and exhausting process. It means exhaustion of the nervous force. If you have a cow that is abused, kept out in the cold, ill-fed and uncomfortable, she will give you less butter-fat, invariably, than one that gets better attention. In butter-making it pays always to be a gentleman. Our folks in Canada are getting to "size a man up" by

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the clothes he wears. That is a poor plan to discover a man's gentleness or greatness. I believe in the meaning of the word in dairying and elsewhere—a man who is gentle and tender and strong. Now, if you will be harsh and cruel with the cows, you are no gentleman; and you will get only a rough man's pay from them.

Then, after the milk is made by the cow it is always economical to have the best process provided to get the butter-fat out of the milk. After the milk is set, if left at rest, its globules of fat which are held in suspension easily rise to the top. Stillness and coolness are two conditions required.

Because many of the patrons of cheese factories use the cheese factory cans for setting milk in, after the factory closes, so as to get a large share of the cream for butter-making, I have had some tests made to discover their suitability for that purpose. I have found the loss from deep-setting in common factory milk cans to be six per cent greater than when the milk was set in ordinary shot-gun cans.

Then, I set the milk at temperatures from 98 degrees down to 78 degrees, putting the cans in ice water, and found no appreciable difference when milk was set immediately after milking.

I have set the milk immediately after milking, and one hour later, and have not been able to avoid losing 11 per cent additional of the butter-fat by the delay of one hour in setting. The slowness of a man is contagious—it affects the fat globules in his milk.

Then we have set the milk for periods of 11 and 22 hours respectively; and in the 11 hours' setting there was an additional loss of 8 per cent by the shorter period of setting.

We have added water at different temperatures, from 160 degrees down to 60 degrees. I found no appreciable difference from putting water in the milk in deep-setting pails.

Then in setting tests with cows at different periods of lactation, averaging 9, 6 and 2 months, we found by the use of the deep-setting pails we recovered only about two-thirds of the butter-fat from the milk of cows which had been milking from five to twelve months. For four days we set the milk pails in water at 38 degrees with the milk when set at a temperature of 78 degrees; and the loss from milk of cows that had calved nine months was 28 per cent; from that of those that had calved six months 21 per cent; and from those which had calved two months 13 per cent of the butter-fat unrecovered.

For four days the milk was reheated to 98 degrees, and set in water at 38 degrees, the loss from the milk of cows which had calved nine months being 34 per cent, from the milk of those that had calved six months 24 per cent, and from that of cows which had calved two months 12 per cent of unrecovered butter-fat.

In shallow pans we obtained better results from the milk of cows calved more than six months than by any other method of setting.

Many farmers say that by the whirling process of a centrifugal machine you cannot get all the butter out. If a cow has calved more than six months, by the use of the centrifugal cream separator you will get over 20 per cent more butter from the milk than by the ordinary deep-setting method. If she has not calved over two or three months you will get about 10 or 12 per cent more butter.

Then, we have been trying the effect of heating milk, to remove that offensive odour which is caused by the feeding of turnips. When we heated the new milk to 150 degrees we have not been able to quite eliminate the odour.

Then we have heated the cream from other milk to 150 degrees. A few years ago it was thought that if you heated the cream above 90 degrees you would burst the globules of fat, and spoil the butter. That is not the case, and by heating the sweet cream to 150 degrees we have quite eliminated all the odour of turnips. The butter seems to keep better, and we got one pound of butter from one pound less of milk than we got by not heating the cream.

A common complaint that comes to us by mail is, that "the butter won't come." Well, the butter will come, if the cream be churned at a proper temperature. I have put the limit of time for churning at 35 to 40 minutes. I heat the cream just high enough to make the butter come, after about 35 minutes of agitation.



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I find some people complain that there are specks in the butter. If you allow the vessel containing the cream to be exposed to the action of the atmosphere, a part of its moisture will evaporate, and a scum or skin will be formed on the top of the cream. That will be broken up by the churning, and you will have merely small portions of thickened, dried cream in your butter. Prevention is better than an attempt at cure. Let the cream vessel be covered, or by frequent stirring prevent the formation of the skin of dried cream. The straining of the cream into the churn is also a necessary measure for keeping specks of thickened cream or curd from finding their way into the butter.

Occasionally, butter-makers find the butter full of streaks. That condition may come from the retention of portions of the butter-milk in the mass of the butter. The addition of a quart of water for every two gallons of cream, after the granules of butter begin to appear, and before the churning is completed, will help to bring about a speedy and full separation of the butter-milk. When the butter-milk has been removed, the granular butter should be washed with cold water. In summer the temperature of the water should be about 55 degrees, and in winter about 60 degrees. For the washing, the churn should be revolved a half faster than for the churning.

A streaky condition of the butter sometimes results from an imperfect mixture of the salt with the butter. Re-working, after the salt is dissolved, will correct that. Fine-grained salt only should be used. The presence of salt should be perceptible to the taste, but not to the sense of touch.

Attention to these few points which I have mentioned will assist you to produce butter economically; and, if the butter be produced under the direction of skilful men in creameries, the labour will be very much reduced, and the profits of every farmer may be increased. At Woodstock and Mount Elgin we have turned the cheese factories into creameries for the winter months; and the farmers there find it a profitable business to send their milk to the factory for butter-making during the fall and winter. I think in Ontario next fall you will find at least 25 cheese factories running as butter factories for the winter. Thus, you will have a more economical production of milk and butter and cheese.

I have to ask you to believe that these little helps and points of information, which you derive from these conventions, do not constitute the sum total of the good which they do. The far-reaching influence of any movement for good is seldom recognized at its beginnings. When the sun shines, the blades of grass, which immediately spring up, do not comprise all his beneficence. Soil is warmed, seeds are germinated, the water for showers is lifted up, and a thousand gladnesses and goodnesses are quickened into being, although at the moment unseen. When the wind whistles through the trees in autumn, many more leaves are loosened than those which let go at once. If only a few prejudices and ignorances yield at first to the truth, let us keep on working for the improvement and enlightenment of the farmer's mind—for the economical production of butter and the gaining of every economic and material good, which the heart of man can honestly and honourably desire.

## (2.)—THE POSSIBILITIES OF SELLING CANADIAN FARM PRODUCTS AT A PROFIT IN THE ENGLISH MARKET.

(*Report of an Address delivered before the Farmers' Central Institute, Toronto, 3rd February*, 1892.)

Professor Robertson addressed the Institute on "The possibilities of selling Canadian Farm Products at a profit in the English market," as follows:—

Mr. President and Gentlemen:—It would be easier for me to address an audience of politicians than an audience of representative farmers. Politicians look mainly for phrases in speeches; farmers expect reliable information and thought.

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Your president has wisely said that you are a lot of excellent men; and that always puts a speaker on his mettle. He is embarrassed (at any rate I am), lest he should fail to instruct, and he is diffident lest he might fail to do justice to his subject. With your president and yourselves, I am exceedingly sorry that the Minister of Agriculture was not able to come here. On Saturday Mr. Carling telegraphed that he was too ill to be present in Toronto, and asked if I could go and give an address, not for him, but instead of him, on the possibilities of selling Canadian farm products at a profit in the English market. He also desired me to express to you his regret that illness prevented him from participating in this meeting.

A subject so great, so important, so far-reaching, would give a man all the task he could very well overtake in a whole year—to enquire, to examine, to read, to collate, to digest, to conclude and to direct. So, if you have some rather imperfectly digested statements, you will please remember that wholesome digestion takes time; and I was not willing to imperil the comfort and health of my own mental digestive apparatus by trying to chew up too many facts and give them out in an unnatural way. You will be good enough to give me your consideration and indulgence this morning, seeing that I have hardly had time to fit myself to present my subject worthily to an audience like this one,—representative of the best thought on agriculture in the Province of Ontario, the premier province of the Dominion of Canada, where the average farmer stands head and shoulders above the average farmer in any land in the world. (Hear, hear.) We have many things in this country to be grateful for and proud of. In "the old land" they have, so they claim, a better system of agriculture than prevails generally within our borders. They have had the educated classes, the men trained in sciences, arts and philosophies, the aristocracy of the land, to make plans for the toiling farmers; and the clear thinking of these men has put England away ahead of all other lands in regard to all farm and animal products, which are so essentially the product of clear thinking. Where do we go for thorough-bred horses? To England. Where do we go for thorough-bred cattle? To England. For thorough-bred sheep? To England. For thorough-bred swine? (A voice—Do you include Scotland?) Wait a moment. I say to England, and for me, this morning, England stands for and embraces all of Great Britain. Where do we go for thorough-bred men? Now, my friend, your question. (Laughter.) I have been referring to these matters for this object only, to show that the clear thinking of trained men of strong intellect has raised the quality of her agricultural products, until England sends around the globe the foundation and improving stock and seeds for the enterprising farmers of all countries; and her farmers do that, notwithstanding the fact that she has no surplus of ordinary farm products. England affords the best market in the world for food products,—acknowledged so by everybody; still she sends the best foundation stock for food products from her island to the uttermost parts of the earth, from the clear thinking of her men. The average farmer in Canada is a better farmer than the average farmer in England. He does not want or need an educated class to stand aloft and aloof and say, "Do so and so." He does not want to have one man as the master, to do the thinking, and the other man as the hind, to do the working; but he, in himself, has the opportunity (which farmers in other lands have not in an equal measure to-day), of governing the products of his own hands, according to the direction of his own mind. He, more than most others, is the man who has the right to think for himself, the man who has the need of thinking for himself, and the man who has the opportunity, in our country, of giving expression to his thought, through his work as well as his words. The meaning and promise of this meeting are, better stock and products of all kinds, better prices for all kinds, better work of all kinds, larger profits of all kinds, from the clear thinking induced by discussion and the dissemination of knowledge. The friction of mind on mind is highly beneficial; as iron sharpeneth iron, so does the face of a man that of his friend in friendly discussion of their common interests. So, what I have to say this morning is to whet the keen edge of your minds, that you may be able to cut through difficulties easier and more successfully; and, having dispelled many imaginary

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objections and obstacles, you may see your way to seek, suit and keep for Canadian farm products the best market or markets in the world,—let these be in England or anywhere else. When a man sees well, he can follow his own judgment without danger of stumbling.

But to come to my subject more particularly and concisely: upon the welfare of the farmers of Canada depends the prosperity of the Province of Ontario and of this Dominion which we love so well. Everybody says so, and many of them say it with a feeling of generous good nature, that they have paid a compliment to the farmer in thus elevating his calling. The importance of agriculture in Canada is prime; it stands first, because all other industries in the country are very sensitive to the condition of the farmer. If he be experiencing hard times, every other industry and interest suffers and is depressed. When the farmer has good times, every other industry and interest is bounding with prosperity. The farmer's success comes mainly from good crops, good prices and good crops come mainly from good cultivation, good management and good weather. The farmer can control two of these, and in the third, we are more bountifully dealt with than most countries in the world, in point of weather, favourable for the growing of large crops, of fine quality. Still, I am not to detain you on these aspects of the farmer's business to-day, but on the marketing end of his calling. It has been very often my privilege to meet representative gatherings of farmers, to discuss with them some aspect of their own business. It has not required any conscious effort on my part to refrain from discussing the question of markets, near or far off. I have not felt called upon to give utterance to almost a single sentence of direction or advice to the farmer concerning the market end of his business. I have been trying to direct the farmer's attention to the home end of his business, the end where his profits are mainly made. The profits are mostly made within the sphere of the man's business, where he can exercise appreciable jurisdiction and control; and the market end of a man's business is subject to the influence if not under the control of all the producers, as well as the buyers in the whole world.

In my humble judgment, public speakers, the press, politicians and other leaders and teachers of the people, have directed the attention of the farmers all too often and much too emphatically to the marketing end of their business. That mischievous course has resulted in leaving on the minds of many farmers an impression (and I would like to have a chance of making the only impression on your minds that is to be made just now), leaving on the minds of the farmers an impression that a market, the market, every market, has some sort of personal, self-contained existence; in fact, that a market is to the farmer of Canada what a deity or devil was to the heathen,—some external power or existence that could bring happy deliverance or wreak dire destruction at mere caprice. A market has no such power, no such functions, has no such existence. Some of the farmers have been even further misguided, in so far as they have been led to imagine that the market, a market, any market, can be charmed into sweet serving by the wand of politicians, or can be chased away beyond touching, tasting, handling or seeing, by their edict of hostility. The markets for farm products—and the moon,—are, in some measure, amenable to the edicts of some politicians.

A few observations, here, may be offered in all simplicity and candour, as to how I think the farmers should regard the markets, which ones I think they should seek to suit, and what services they ought to expect from them. I desire to discuss this wholly from an economic standpoint, not partizan, not political; because I have neither partizanship nor politics, except for profitable agriculture. A preference for a market, a preference for selling in a market, a preference for buying in a market, may have a sentimental basis as well as a purely economic one. There are men from whom I would rather buy at the same price than other men; there are men to whom I would rather sell than to other men. Sentiment accounts for a great deal that we do in business, and other affairs. A market is merely a name for an exchange of commodities, such as eggs for sugar—a market; butter for groceries —a market; wheat for clothes—a market. Money is used as the medium of exchange,

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according to certain values mutually agreed upon. Money is a medium for facilitating the transactions of marketing; it does not create a market. Marketing is exchanging things; getting money is another question altogether; marketing is exchanging things always. A market has come to be almost wholly a place for the exchange of products for money. It is unwise to use carelessly the terms "producer," and "consumer." Many men get all kinds of mists around their judgments, because they hold that a farmer is always a producer, and a townsman is always a consumer. A farmer is a consumer and a customer—he is a consumer of binding twine, of cottons, machinery, furniture, and a score of other things. A farmer is as much a consumer as a townsman is. He eats as much, man for man, and works as much, man for man, and lives as well, man for man. And the man who lives in town, if he is honest and earns his living, is as much a producer as a farmer. There is no such thing as honest, intelligent, non-productive labour in the town or the country. I want a suit of clothes, or a collar, or a pound of tea, or a legal opinion, or a pair of shoes, or a sermon, or candies, and somebody must produce and furnish these things for me. I am a consumer, as well as a producer, although I live on a farm. A farmer is essentially a food producer; that is his proud title; and when he gives in any form a food product in exchange for money or other commodities, he markets his farm products—essentially and mainly his food products. He has also other things to dispose of, of which he may justly be called a producer, such as horses, wool and wood. Wood is a farmer's product, in the sense of it meaning a commodity increased in value by the farmer's toil and grown on his fields. The marketing of these things is not different in its nature from the selling of food products. In the market, the farmer needs to meet the customer or consumer, who wants what he has to dispose of, and who is willing and able to give him a good exchange. A customer or consumer, on his part, wants to meet a seller who has what he wishes to procure. If another man has in abundance already what I have to offer for sale, why should he want what I have to sell, except to re-sell it at a profit which I would rather obtain by selling direct to the ultimate consumer? A most advantageous quality in the market is, that the customer should be the man who ultimately wants to use the article which he buys, lest in the meantime another party should step in and get part of my profit as producer, and part of his price as consumer, and thus raise the price to him and lessen the price to me. If there be only two individuals, a seller and a buyer, and they cannot agree upon the terms of exchange, no business will be done. If there be two sellers and two buyers, then the one seller's opinion and judgment is not the only factor on the selling side of the problem of price. The other man's competition may make him change his mind; and I want to show you the meaning of that. John Brown takes to town a load of cordwood and says: "I will get $4.50 a cord or I will take it home." John Black is the only man who wants cordwood that day. He says, "I will buy at $4.25 a cord, and if not I will wait until to-morrow." John Brown does not see anybody except John Black, and he takes the cordwood home. When he goes to the market next day, he finds four other men with cordwood there, and four other buyers who want cordwood. John Evans says, "I would rather take $4.40 than take my load home," and, if he sells it at $4.40, it weakens the judgment and determination of the other men to hold out for $4.50. It subjugates the individual judgment to the common judgment of the whole of the sellers and buyers. There is some difficulty sometimes in understanding what is called the law of supply and demand. It is nothing more, in my judgment, than the general consensus of opinion of all buyers and sellers as to the relative values, at a given time.

You will bear in mind there are three-fold competitions in markets: a competition between buyers, which tends to raise prices; a competition between sellers, which tends to lower prices; and there is a third competition which is often forgotten—that between products for preference in the market. It is not hard for an excellent quality of anything to displace a poor quality at the same price. If we in Canada, in looking at this question squarely in the face, could induce more competition from buyers, the tendency would be to raise prices. If we in Canada can improve quality,

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so as to furnish better goods, the tendency will be to displace other products of other countries, get higher prices for our own, and get control of the market. The course for us in our own markets is to induce competition from buyers, to improve quality, and, as far as possible here, to avoid competition between producers. Now let me show you again: Tom Brown and John Black have produced fifteen pounds of butter each; the local markets at their village will take ten pounds from each man. Both men have a surplus to send somewhere else. Then, these five pounds of butter from each meet elsewhere in competition. They are competing again at the other end where these five pounds go. If by any means Tom Brown can provide another market for the five pounds of his own make, or the five pounds of John Black's make, so that it will not meet his in competition, nor displace in the market any other five pounds which can meet his in competition, it will be to the advantage of all producers of butter. If any man who produces can get exclusive control of a market, it will be easier for him to get the highest price which the market will afford. Nations, acting in their collective capacity, are to be considered as aggregations of individuals,—John Browns and Tom Blacks,—and if you will find a principle that will apply successfully to the business of John Brown under given conditions, it will apply successfully to the business of the biggest nation on earth under like conditions. A principle is like a law of the universe; it does not adjust itself to individuals; the individuals and nations that accommodate themselves in conduct to right principles will flourish best. Let me apply a few principles to markets, and I will apply them to nations and measure the wisdom of their actions, according to their conformity to these principles. Nations, like individuals, need customers, who want to use, as ultimate consumers, the surplus of goods which they have to sell. In the market we look for and expect certain things—

1st. Accessibility to customers.

I have an aversion to tolls on the way to market. It bothers me when I have to take out my pocket-book on cold and wet days to pay them; it is disagreeable as well as expensive. If there was a market at the end of a road with a toll on it, and another market at the end of another road with no toll on it, I would go to the market which was reached without a toll. You can call a toll anything you like, but it stands between me and my customer, and takes something from me or my customer.

2nd. I want in the market a permanency of adequate demand. Commerce is always shy; she is shy of uncertain markets. Commerce, like most girls, is very coy, and wants a little coaxing.

3rd. Then, I want a fair chance in competition in the market.

4th. I want discrimination as to the quality of goods. If I think my goods are better than another man's, I wish to get a better price, so as to encourage me to go on doing that style of business in production.

Accessibility by good roads, railway and steamship lines included; no tolls if you can help it; permanency of adequate demand, so as to avoid the irritation that comes from uncertainty; a fair chance to compete with other goods in the market; discrimination of quality that will induce each seller to go home and do better next time; these are the qualities that you want in the market to which you take or send your products.

The buyer in a market has particular wants, and, if I do not look after them, I will be a fool, for it is he whom I want to please with my goods. The requirements of an available market must be studied. If a man went to Ireland to sell badges on the occasion of any public festival, and had the badges all of a red colour or a blue colour, he would not sell many, even if they were of good material and cheap; but if he had them of green, he would sell them freely. He would be required to study the wants of his customers, or the prejudice of his customers, or the preference of his customers, and cater to their tastes. If you do not do that, you cannot keep any market, even after you have obtained it. The market must be studied and suited, to be kept. It takes time to get a demand; it pays to study to create a demand, to overcome prejudice, to win a preference, which is always a decided advantage.

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I went into a shop in Scotland, a good many years ago, in which Scotch Cheddar cheese was retailing at sixteen cents per pound, and Canadian Cheddar cheese was retailing at twelve cents per pound. By all the rules and standards of nourishing qualities, wholesomeness, taste and appearance, the Cheddar cheese from Canada was worth four cents more than the other; but the prejudice of the people made them willing to pay four cents a pound more for an inferior quality. We have reversed that now in some measure, and have won a preference for our goods. It is a big thing to have a preference in your favour, and it is a bad thing to have a prejudice against you.

Does the English market meet these requirements? The English market is accessible. I shipped fresh-made creamery butter from Woodstock, Ont., last week, to Liverpool, for 55 cents per 100 pounds for freight charges. It will have cold transit all the way, with no depreciation in quality. Can you send butter from your own place, twenty miles back from the city, to the market for less than half a cent per pound? From Woodstock to Liverpool it costs me 55 cents per 100 pounds. The market is permanent. There is an adequate demand. England is the largest importer of food products in the world. Then there is a fair chance in competition in the English market, and there are not any tolls. John Brown lives in Oxford county. They have tolls in Oxford county. Another man, Tom Black, lives in Middlesex county, where there are no tolls. John Brown takes to market a ten-pound basket of butter, and it costs him on the road two cents a pound for tolls. If the butter sells no dearer in Woodstock than in London, the Middlessex butter-maker would have the better chance to make marketing butter pay, by at least the two cents per pound of toll money. England does not have any tolls on farm products.

Then, there is discrimination of the keenest, sharpest kind. The English market will pay to-day for cheese from three cents up to seventeen cents a pound wholesale —discrimination! It will pay for butter from six cents to thirty-one cents— discrimination! That is the kind of a market I want. I do not want a market where everybody gets the same price, whether the quality be excellent or poor. That treatment tends to discourage the efforts of the people towards improvement in quality, which alone can give permanent success. Then there is the competition between buyers of the keenest kind. Napoleon, a good while ago, said England was a "nation of shop-keepers." If you have a nation of shop-keepers, they, for the sake of profit, will compete; and the competition will always push things to the very verge of maximum price. England has been called a nation of shop-keepers; she is a nation of shop-keepers and food consumers—shop-keepers to compete for, and food consumers to use what we have to sell. We are a nation of farmers, a nation of food producers. We have food to sell; they want food to buy; they have a good, ready, permanent demand, competition and fair play; I want to sell there, if they will treat me in that way.

The possible profit from production does not all reside in the market price. The enlarged and improved carrying facilities of the world have made competitors out of men who are far removed from each other in geographical location. At Woodstock, Ont., in the production of butter, I am a competitor of a man who is on the other side of the earth, in New Zealand. It was not always so. I can take you back to a little shop in Scotland, where we used to send butter made on the farm; a few other farmers were then our only competitors. But you can go there now and buy American and New Zealand butter, and the New Zealand dairyman meets me there and has become my competitor. It is not of my will that it is thus, nor only of his will. It is the progress of civilization and the progress of humanity that have made competitors out of producers all over the world; and we cannot help ourselves. Since I cannot control the market price of my products, my profit at that end is an uncertain quantity. Profit always comes between the price obtainable and the cost of production. If it costs me here fifteen cents per pound, and I can sell there for twenty cents per pound, I have five cents of a margin for profit. If I can reduce this fifteen cents of cost, by the application of good business methods, to ten cents, I lengthen my line of profit at the safe end of the business, where nobody

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comes in to interfere and prevent me from getting it. Therefore, the main profit is made at the home end of a man's business, which he can control. The home end of a man's business, in every sense, is the one which he should look after most.

The food products from the farms in Canada are mainly eaten at home in our own country. I want to show you the gain in market capability and market capacity in ten years. The growth of population who eat food, but who do not produce food, in ten years has been 384,146. That is the increase in the population in cities, towns and villages of over 1,500 souls each. These people consume the farm products of Canadian farmers, at wholesale farm prices, to the amount of $21,000,000 annually. We send to England and the United States now, of the same things—farm products—leaving out horses and hay, to the value of $35,955,986 annually. Our whole export from Canada last year, ending 30th June, 1891, to Great Britain and the United States, in farm products—except horses and hay—amounted to that sum. The total export to the United States of the same things in the same time reached the value of $10,017,390. The extra people that have come into the towns of Canada in ten years buy from Canadian farmers twice as many dollars' worth of their food products annually as we send to the whole of the United States. That means a good deal. I do not like anybody that tries to create a feeling of antagonism between the townsman and the countryman. The townsman is a customer of the countryman and the countryman is a customer of the townsman, and there should be no antagonism. If their interests are not identical, they are, at least, harmonious. All efforts to create distrust and dislike between the agricultural and manufacturing interests should be refrained from. As the towns grow, the country makes some progress; they mutually benefit each other.

Suffer a few words as to the kind of farm products which we can sell anywhere, with advantage to ourselves as farmers. We have in Canada only so much of certain valuable elements in the soil, and when we sell off any farm products we sell off some of these things. The constituents in the soil which are essential to plant growth, and which in many places are becoming scarce, are nitrogen, phosphoric acid and potash. If a man sells a large quantity of these things for a small price he impoverishes his farm.

Nitrogen, phosphoric acid and potash in one ton each of some farm products:

| | Nitrogen. | Phosphoric Acid. | Potash. |
|---|---|---|---|
| Wheat | 41.6 lb. | 15.8 lb. | 10.4 lb. |
| Barley | 32 | 15.4 | 9. |
| Oats | 38.4 | 12.4 | 8.8 |
| Pease | 70.6 | 17.2 | 19.6 |
| Beans | 81.6 | 23.8 | 26.2 |
| Indian corn | 32. | 11.8 | 7.4 |
| Hay | 31. | 8.2 | 26.4 |
| Clover | 39.4 | 11.2 | 36.8 |
| Potatoes | 6.8 | 3.2 | 11.4 |
| Fat cattle, alive | 50. | 31.2 | 2.8 |
| Fat sheep, alive | 44. | 22.6 | 2.8 |
| Fat swine, alive | 34.8 | 14.6 | 2. |
| Cheese | 90. | 23. | 5. |
| Milk | 10.2 | 3.4 | 3. |
| Fine butter | .5 | 0 | 0 |

In every ton of barley the farmer sells 32 pounds of nitrogen, 15 and one-half of phosphoric acid and 9 of potash. If a man will persist in selling a ton of hay and a ton of oats—the two tons for $30—he will sell as much of the elements of fertility off his farm as he will dispose of in two tons of fat swine for $200. If he sells fat beef, he will sell about one-half more for $200 than he sells in the other case of primitive products for $30. If he sells cheese, he will get for the cheese $200 a ton, and sell less in one ton than in two and a half tons of hay for $25. If a man will sell a ton of hay for $10 he will sell about 87 times more out of his farm

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for that sum than he will for $500 in butter at 25 cents per pound. Cheese is more exhaustive. Fine butter is nearly all carbon, but strong butter has some nitrogen in its ammonia. Strength acquired in that way has not any money value.

I will read to you for a moment the judgment of the Department of Agriculture of the United States of America on this question, from an official publication in December, a year ago, as prepared by the Hon. J. A. Dodge, official statistician of the Department of Agriculture at Washington, and since issued under the authority of the Hon. Mr. Rusk, Secretary of Agriculture:—

"Competition in production leads to excess or surplus, which tends to reduction of price. Competition can be stimulated to strengthen demand, both in domestic and foreign trade. The former is the wider field, because occupied exclusively; the latter is a supplementary resource of great importance. We possess the markets of this country, and propose to keep them; we may share, while we cannot monopolise foreign markets, at least so far as to supply deficiencies in foreign production. At your request, I will assume the task of indicating the extent of foreign wants, and the means by which a larger demand for dairy products may be enjoyed.

"In seeking a wider movement of these products towards the markets of the world, I would not for a moment encourage the delusion that the exportation of the crude and bulky products of agriculture can be indefinitely extended or made profitable in foreign trade. That idea is held and promulgated either in ignorance, or for a partisan purpose. The hay and forage from nearly 200,000,000 acres, representing great values, we could not export if we would, and should not if we could. Vegetables in their crude form are ineligible for exportation. When corn is worth but $8 a ton, it is folly to pay for transportation four or five thousand miles, in preference to shipping it in beef worth $180 per ton, in cheese at $200, or butter at $280. Our agricultural exports are practically confined to cotton and tobacco, to meat, breadstuffs and dairy products. The cotton is worth as much as cheese, or $200 per ton. Tobacco averages $180 per ton. Wheat with a value in the garner of only $30 per ton is not worth shipping to meet the competition of the rudest and lowest agriculture of the world, and its exportation will gradually decline. It is only sustained now by the exigencies of a primitive and slovenly system of agriculture.

"It is not merely the cost of transportation, which railway development has cheapened extraordinarily, that should bar this foreign movement of primitive products, but the reckless waste of plant food, tending to rapid sterilization of the soil, and consequent reduction of its rate of yield. We are learning slowly the avoidance of this waste; in cotton, by making oil of the seed and feeding the oil-cake, exporting only the fibre, which contains little that is exhausting to fertility; in wheat, by milling and retaining the bran and shorts for the use of the dairyman and other feeders; in corn, by transformation into pork, and returning to the soil a large proportion of its elements; in milk, by sending only cream to butter factories, and retaining nearly all that proves exhaustive. We cannot afford to export, or waste otherwise, the fertility garnered in a thousand years of growth and decay of vegetation. It is the capital of the farm that should be held as a sacred heritage for the use of the future generations, and not squandered prodigally, but increased by every means offered by scientific agriculture, both for prospective personal profit and the prosperity of our descendants. Such recklessness is the suicide of thrift and the annihilation of the birthright of prosperity.

"The lessons to be learned, therefore, relative to the extension of foreign trade, are two, viz.: That the expense of transportation should be minimised by the selection of products of high value in proportion to weight, and the loss of fertility should be avoided by the exportation of carbon, rather than nitrogen and phosphoric acid. This course not only conserves fertility, but simplifies the transportation problem."

I will speak a little while on the possibility of getting a profit in the English market from selling animals and their products. Let me tell you what quantities have been imported by Great Britain, which will show the extent of the market opportunity

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for these things during the past year. The exports of animals and their products to Great Britain from Canada in 1880 amounted to $11,104,223. In 1890 these had risen to $18,578,722, and last year, to 30th June, 1891, they had risen to $19,840,492. In eleven years we have gained in sending these things to the English market from eleven millions of dollars to nearly twenty millions of dollars in a year. That shows where our food products in the form of animals and their products are going. We sent to the United States, during the same period, of the same things, in 1880, to the value of $6,016,988. In 1890 these had fallen to $5,966,474, and last year we sent only $3,148,463 worth. That shows a decrease in the exportation of these things to the United States, and an increase in the selling of these things in the English market. For why? Do you think that the people of the United States are blind to the teachings of their own leaders? They are seeking a foreign market themselves for the same things, and they are meeting us on the English markets with them; therefore, they do not need ours. They do not want ours, unless to get them and make a profit from the handling. Great Britain recognizes the advantage of producing on her own farms more animals and their products; and in the last two years they have increased the cattle which they have by 11·6 per cent, the sheep and lambs by 12·1 per cent and the swine by 15·1 per cent.

### CATTLE.

The imports of cattle from Canada last year, ending December, 1891, into Great Britain, were 108,289, and the value was $8,623,202. The oxen, bulls and cows averaged $81.40 each at the landing ports. Freight, including landing charges, cost about $28 per head. If the farmers of Canada cannot make a profit in fattening steers and selling them at $53.40, on the average, each, they have only one alternative. They cannot lift that market; it is a market of 507,407 cattle, imported at a value of $41,673,659. If they have not made a profit selling at $53, they can do so now by reducing the cost, by the growth of fodder corn and the feeding of ensilage.

Then we have an advantage in selling cattle to the English market, in that our cattle can go alive to all the inland towns of Great Britain, and that is worth from $2.50 to $5 a head to us, above all other competitors, who are barred from doing that. We can send at an increased profit by improving the quality of the animals. We do not want these great, long, thin, tall animals that some men want to breed all the while. In the English market you will get about twenty per cent more per pound for the low-set, compact animals. The possible profit might be greater if we would export dressed beef instead of live cattle, in many cases. I have been mildly abused and opposed for recommending the establishment of large slaughter houses in Canada. But you do not send to England live animals without having them reach Liverpool bruised and jaded, fevered in condition and lighter in weight; while dressed beef in a cold storage compartment does not deteriorate. At present, the retail butchers in England are opposed to any change that will prevent them from realizing the larger profit which they make from sales of meat from fresh-killed animals. We will be able to overcome that hostility and, after a time, put our beef and mutton on the English market in the most economical way. We should seek to develop the trade in fattened beef, and not in lean steers. I will read you an extract: "When we ship over to Great Britain store cattle, we ship cattle that should have been fed in our own stables, and that should have produced for ourselves the profit which the Englishman produces for himself by buying the animal and feeding it in Great Britain." That is from the address of your president last year.

### BEEF.

The total value of beef imported into Great Britain in 1891 was $21,386,610. In the year ending 30th June, 1891, Canada sent only $740 worth.

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### SHEEP AND LAMBS.

The total number of sheep and lambs imported into Great Britain in 1891 was 344,504. Canada sent in the year ending 30th June, 1891, to the number of 40,732. Some experiments in the shipment of lambs to the English market were made and reported upon by Professor Shaw, whose excellent reputation is known throughout all Ontario. He states, as his conclusion, that a profitable trade in the shipment of lambs of good quality can be developed with England. With many others, I have been curiously amused at the criticisms of some who belittled Professor Shaw's earnest effort to hasten the agricultural millenium—the time when the British Lion and the Canadian Lamb will lie down together in peace.

### MUTTON.

The total value of mutton imported into Great Britain in 1891 was $15,972,404. Canada sent $8,066 worth in the year ending 30th June, 1891.

### SWINE PRODUCTS.

The total value of bacon, hams and pork imported into Great Britain in 1891 was $48,868,234. The total value sent from Canada in the year ending June, 1891, was 7,530,079 pounds, with a value of $626,037. Denmark, with a population of about 65,000 greater than Ontario, sent over 52,000,000 pounds, for which she realized an average of 12 cents a pound. We realized about eight and a quarter cents; and the bacon from the United States was entered at an average of about 7 cents per pound. The Danes have learned to cater for their customers, and have not believed in trying to sell lard to a man who wants to eat lean pork. So it will pay us to get leaner and less lardy hogs. The quality that is wanted is lean pork from dairy-fed swine. To meet the requirements of the English markets, larger numbers of our swine should be sold by our farmers alive. They could then be slaughtered at packing houses, where the carcasses could be treated and cured in a uniform satisfactory manner. As a rule, it pays the farmer and feeder better to sell his swine on foot than to market them as dressed hogs. Canada competes in the English market with the United States, which sent to England the largest proportion of the bacon she imports. That realized 7 cents per pound, and our bacon will sell for a cent to a cent and a quarter higher, because our pigs are fed on the by-products of the dairy and mixed cereals, while theirs are fed chiefly on corn. We can increase the profit by reducing the cost through economical fattening and selling the animals before they are too large and old. In the course of feeding experiments at the Experimental Farm, Ottawa, six pens of pigs were fed for over five months. The experiments at the farm at Ottawa show that four and one-half pounds of grain will give one pound of increase in live weight of swine, and that it is not profitable to fatten swine for any market after the weight of the animal exceeds 200 pounds alive. In some feeding tests, during the first month of feeding, when the pigs weighed from 77 to 103 pounds each, only 3·31 pounds of grain were required for each pound of increase in weight. During the next month, 3·07 pounds of grain were consumed for every pound of increase in live weight. During the third month, 31 per cent more grain was consumed for every pound of gain; 86 per cent, 110 per cent and 125 per cent more grain was consumed for each pound of gain during the next three months, respectively. At the end of the test the pigs weighed an average of 231 pounds each. For the last month's feeding 6·93 pounds of grain were consumed for every pound of increase in live weight.

Further particulars on the fattening of swine will appear in my annual report.

By winter dairying you will find it possible to increase the supply of hogs, as well as to produce them cheaper. I do not know any way of raising small pigs successfully and economically, except by the use of skim-milk after they are weaned. The winter raising of young pigs, to be fed off and sold during June, July, August and September, should be a very profitable adjunct to winter dairying. The English market will take an unlimited quantity of well-fed lean bacon and hams.

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### CHEESE.

The total value imported into Great Britain, in the year ending December, 1891, was $23,434,829. Canada sent of that $9,692,438, and the United States sent $8,660,817. In 1881 we sent to Great Britain cheese to the value of $5,510,443, and now it is nearly $10,000,000 a year. Ten years ago—1881—the United States sent cheese to the value of $16,380,248, and last year—1891—$8,660,817. We are gaining on our competitors by sending to England the kind of goods for which they have a preference; and, if we will do the same with other articles, we will win an equal preference and advantage. In this commodity also it is possible to increase the profits by reducing the cost of production. The Hon. Thomas Ballantyne said very lately, in my hearing, that he had one cow that gave last year over 12,000 pounds of milk, and another one which yielded 11,000 pounds. By enlarging the capacity of our cows, lessening the cost of their feed by the use of corn ensilage, and improving the quality of our cheese, the profits may be greatly augmented. The English Cheddar cheese retails in England, in some cases, for 8 cents a pound above Canadian Cheddar cheese, and the latter occasionally sells for 8 cents a pound more, under the name of English Cheddar. I want the Canadian cheese marked on the cheese as well as on the box. We are making an effort, by branding our cheese "Fancy Canadian," to gain for our farmers the higher price, which presently finds a stopping-place in the pocket of the crafty English shop-keeper. The shipment of cheese from the Dominion Experimental Dairy Stations is having the effect of still further advertising the fine quality of our cheese. The trade with England might be doubled, as doubtless it will be in a few years, when the Maritime Provinces have their dairying developed. In Prince Edward Island, which is admirably adapted for dairying, the farmers thought it would not pay, and that fodder corn would not grow. Last year, from the meetings which I addressed in the Maritime Provinces, I sent out 524 samples of corn, to plant nearly a quarter of an acre each; and you never before heard such glowing reports as I have been receiving since. In England we have had to meet with competition from inferior goods from foreign and our own markets. Three years ago cheese from Quebec sold for an average of about one and a half cents per pound less than Ontario cheese, and last year less than one half cent per pound lower than Ontario cheese. Quebec is going ahead at a faster rate than Ontario, and will soon outstrip you in cheese and butter in the English market, unless you mend your ways. In Quebec, it is estimated that they have nearly 3,000 silos, and you have not nearly so many in Ontario.

### CONDENSED MILK.

In the matter of milk, we might send to England a great quantity of condensed milk. England imported in the year ending December, 1891, $4,124,745 worth. We have only one condensed milk factory in Canada, and the quality of the product manufactured there is most excellent.

### BUTTER.

In the matter of butter, Great Britain imported during the year ending December, 1891, butter to the value of $56,410,414. Of that quantity, Denmark sent $23,680,421; France, $14,785,239, and Canada $912,307. Why did we send so little? Because we have not learned the art of making butter in the cheapest way, of the best quality, and at the most favourable season of the year. Denmark makes the largest share of her butter from September to March. The average price realized by the Danes was 24 cents, and by Canada 18½ cents per pound. We have sent lately a shipment of 186 packages from the Experimental Dairy Stations at Woodstock and Mount Elgin, which I think will sell as high as the finest Danish butter. We have been running a creamery at Woodstock on the cream-gathering plan. The farmers set the milk on their own premises, raise the cream and furnish that. We

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have also one at Mount Elgin, where we take in all the milk and use a centrifugal cream separator. By the use of a centrifugal cream separator we can get from 15 to 30 per cent more butter from the same quantity of milk, when the cows have been calved more than six months. It means that there is the possibility of a very much greater profit when all the cream is taken out by the centrifugal machine. The English price for fresh-made, fine butter is always high during the winter. A responsible firm of exporters of dairy products has offered to provide one half the amount required to alter 25 cheese factories into creameries for the manufacture of butter during the winter. By the use of a centrifugal cream separator at a creamery during the winter, from 15 to 30 per cent more butter can be obtained from the same milk than when it is handled in the ordinary way at the farms. A higher price can always be obtained for quality that is uniform. The winter creameries will enable us to ship $1,000,000 of fresh-made creamery butter to England, annually, during the winter, within five years; and these 186 tubs from the Experimental Stations are the first which have ever been sent.

### POULTRY.

The value of poultry imported into Great Britain, in an average of three years, 1888, 1889, 1890, was $2,229,885, annually. The average from Canada during these three years was $1,500. Is it possible to sell poultry at a profit in the English market? Smith's Falls has the largest poultry market in Canada, before Christmas time. The price last year of turkeys, there, in December, was from 7 to 12 cents per pound; and the price in Liverpool for turkeys dressed was 21 to 26 cents per pound. The freight to Liverpool is from one and a quarter to one and a half cents per pound. Mr. Dawson, of Brampton, has made his fourteenth annual shipment, and they have arrived in good condition and sold at a profitable price. I have a letter from Messrs. Thomas Borthwick & Co., who are said to be one of the largest dealers in this particular line of product in Liverpool: "We beg to inform you that the large consignment of Canadian turkeys received by us at Christmas, and which were packed strictly in accordance with the instructions you sent out to the shippers, arrived in good order, and met with a ready sale at what must have been remunerative prices to them. We beg to point out that, if turkeys of good quality, and shipped according to your directions, should arrive at the proper time next season, there is practically an unlimited demand for them, as we have introduced them not only into Liverpool, but to all the large towns with which our business is connected, viz., Manchester, Birmingham, Sheffield, Oldham, Rochdale, Leeds, Leicester, Wolverhampton, Hull, Bradford, Cardiff, Bristol, Glasgow, Edinburgh, and other large centres of population in Yorkshire, where they have met with great favour. With careful feeding, packing and forwarding by fast steamers, they would be a formidable rival to turkeys from the continent, and, indeed, be a formidable rival to the home article. We cannot help thinking, after the experience gained in dealing with Canadian turkeys during the last two years, that, properly handled, a large development of this trade may be confidently looked forward to."

### EGGS.

There were imported into Great Britain, in 1891, 106,811,370 dozens. Canada has been exporting about 12,839,000 dozens annually. Up to the past year we have sent to England annually an average of only 1,849 dozens. We used to send lots of eggs to the States, and they wanted them, but now they want something else besides them, and that is a big toll. Last year we sent to Great Britain just because we were compelled (a voice—"Yes, because we were compelled"). You know a man's salvation often dates from the time when he was compelled to consider his circumstances and adjust himself to new conditions. We sent to Great Britain last year 2,269,757 dozens. The Government agent at Liverpool, Mr. John Dyke, writes as follows:—

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"The best quality of Canadian eggs compare very favourably with those from the continent, except as regards those known as 'best French.' These come principally from a small district in Normandy, are specially selected and are shipped without delay. This supply, however, is very limited, and does not affect the general trade.

"Danish, Austrian, German, French and Irish are not so good in point of size as Canadian. The best Austrian and German weigh about 14 lb. per 120, Danish 14 to 15 lb., best Canadian, 15 to 16 lb., with specially selected as much as 17 lb. per 120. Price: at the time, German and Austrian were making 8s., 8s. 2d.; Canadians were making 8s. 6d., and they have ranged from that to 10s. 6d. per 120.

"Freights on German and Austrian are 5d. per 120, from Hamburg, and they may be set down as 1s. from the principal points in the interior of Europe from which they come. From Canada, on the other hand, the rate is only 6d. per 120, from points as far west as Port Perry, Ont., and from Prince Edward Island, and this is actually 1d. to 1½d. per 120 cheaper than it costs to get eggs to Liverpool from the west of Ireland.

"When in long cases, they should be packed in long, clean, dry straw, rye for preference. When sent in patent packing, the cardboard boxes should *not* be filled in with oat hulls or chopped straw. There should be no necessity for it. Oat hull or chopped straw packing should not be used at all. It is objectionable, as, in the case of the breaking of one egg, this packing holds together the three or four surrounding eggs and spoils their appearance."

"Eggs should be shipped as fresh as possible, and the more rapid the transit the better.

"Import of eggs into Great Britain from the continent:—

| | | |
|---|---|---|
| 1889 | 94,166,390 | dozens. |
| 1890 | 102,912,460 | do |
| 1891 | 106,811,370 | do |

(including those from Canada)."

There is a fair prospect for a large and remunerative trade with England, when experience has enabled shippers to avoid losses from breakages, and has induced the steamship companies to provide refrigerator space at low rates.

### RECAPITULATION.

The total value of these animals and their products which I have enumerated, which were imported into Great Britain in 1891, was $240,864,671. In the year ending 30th June, 1891, we exported of these products to Great Britain to the value of $19,684,238, that is, practically eight and one-sixth per cent of the total value of these things which she bought from abroad. We sent to Great Britain and the United States during that year, altogether, $21,617,679 worth of these products. We really sent to England of these things that I have enumerated, beginning with cattle and ending with eggs, food products from the farms to the value of $19,684,238. And we sent of the same products to the United States to the value of $1,933,441. I am confident we can extend this trade until we send to England 30 per cent of all the food products she buys. We have the area, the cattle, the climate, the carrying conveniences, and all we need is more men. The men we have now do fairly well, but they might do better; and if we do everything we can, we can capture a larger share of this market and get one-third of it. In area, we are the third largest country in the world, and our magnificent plains in the west are filling up.

### HORSES.

Great Britain imported in the last three years, 1888, 1889, 1890, an average of 14,874 horses annually, of which Canada sent 179 a year. The horse market is dull in Canada. Horses in England and the United States are just as much cheaper than they were as they are here. In Ottawa, the Electric Street Railway Company furnish a most excellent service on the streets, with electricity as the motive power.

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Toronto is discussing the feasibility of having electric street cars. It has been stated by writers of good repute that the substitution of electricity for horses lessened the demand by 25,000 on this continent, alone, during last year. If the demand has been lessened, there appears to be only two remedies, either to produce less, or to produce the kind that is now wanted. The horse that is mainly wanted in England is of a lighter style than we have been breeding. They are in demand for cavalry re-mounts; the average price there is £30 to £40. It costs about $45 each to ship them there.

### CANADIAN GRAIN PRODUCTS.

It is contrary to my own preference to advise the farmer to sell any primitive grain product off his farm; but some men will have a surplus, and as we will have a surplus as a nation, let us see if there is a possible market in England at a profit. Great Britain is the centre where competition meets us from the whole world.

### WHEAT.

The wheat crops of the 22 main wheat-producing countries in the world in 1891 were estimated to be 2,029,302,500 bushels. The following are the particulars:

Yield of wheat in different countries in the world for season of 1891:

| | Bushels. |
|---|---|
| England | 70,125,000 |
| France | 226,875,000 |
| Germany | 85,250,000 |
| Italy | 100,375,000 |
| Netherlands | 41,250,000 |
| Switzerland | 8,250,000 |
| Belgium | 15,125,000 |
| Denmark | 1,787,500 |
| Sweden and Norway | 4,675,000 |
| Spain | 74,250,000 |
| Portugal | 7,975,000 |
| Austria | 39,875,000 |
| Russia | 182,875,000 |
| Hungary | 116,875,000 |
| Roumania | 45,375,000 |
| Bulgaria and Eastern Roumania | 34,375,000 |
| United States | 525,250,000 |
| Canada | 60,500,000 |
| Algiers, Tunis and Egypt | 66,000,000 |
| East India | 269,990,000 |
| Australia | 31,625,000 |
| Turkey | 20,625,000 |
| Total | 2,029,302,500 |

Some of the information I have gotten from reports or publications of the Board of Trade, Vienna. Of the countries which require an additional quantity for home use, England takes 148,000,000 bushels, and France 82,000,000 bushels. These are the only two countries, that buy a quantity of wheat, with which we have any direct trade relationships. The United States yield last year was estimated in Vienna at 525,000,000 bushels, and they will have available for export about 165,000,000 bushels. Another estimate for the United States has been issued by Henry Clews & Co., of New York, the well known crop authorities. Their figures are:



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| | Estimated Production. | Required for Home Consumption. | Available for Export. |
|---|---|---|---|
| Wheat, bush... | 600,000,000 | 360,000,000 | 240,000,000 |
| Corn do ... | 2,065,516,000 | 1,700,000,000 | 365,000,000 |
| Oats do ... | 758,559,000 | 600,000,000 | 158,559,000 |
| Rye do ... | 36,000,0 0 | 22,000,000 | 14,000,000 |
| Barley do ... | 77,400,000 | 67,000,000 | 10,400,000 |

Last year Great Britain imported wheat to the value of $143,314,592. She imported wheat-meal and flour to the value of $49,566,450; and perhaps she will go on importing still more as her population becomes more dense. Of wheat and flour, Canada exported to Great Britain, during the year ending 30th June, 1891, to the value of $1,821,046. It has been reported that during the four years from 1871 to 1875 the increase in the area of land in the United States occupied for cultivation was 32 per cent. From 1875 to 1880 the increase was 34 per cent. From 1880 to 1885 it was 19 per cent. During the last five years, 1885 to 1890, the increase had been only 7 per cent, or an increase of 1¾ per cent per annum. That means they have reached almost the topmost limit of their expansion, and they are expanding slowly in the area which they cultivate. We are only beginning to extend our area of cultivation; and the inexhaustible agricultural riches of the North-West have only been touched. I think we will be able to export our millions of bushels of grain and millions of dollars' worth of animal products from that part of our country. That will bring re-payment of the big investments we have been making in its behalf.

### BARLEY.

In the matter of barley, Great Britain imported, in 1891, 34,931,396 bushels, having a value of $28,916,920. Canada has been sending to England very little barley. During the past season a little over 300,000 bushels of two-rowed barley were shipped, and the price paid to the farmers here has been from 8 to 15 cents higher than for six-rowed barley. It has not met with the same favour in England as, perhaps, some of us expected: for this reason, that the English market in everything is a discriminating market. Farmers need to have the different qualities graded properly, cleaned properly and kept separate, so that everything will stand on its own merits and quality. The Russian Government has been moving vigorously to establish a system of grain inspection at its ports, for Russian wheat has been dumped into England indiscriminately, and consequently brought the lowest prices. The prices in England for barley have been ruling at 36 and 40 shillings per quarter. That means a price of 92½ cents for our weight of 48 lb. to the bushel. The freight and charges from Toronto to Great Britain vary from 25 to 27½ cents per bushel. If we had a quantity of barley as good as the samples which were sent, it could have been sold in England at 36 shillings per quarter. The expense of getting it there would not be over 27 cents a bushel; that makes it possible for the Canadian farmer to realize 65 cents per bushel of 48 pounds. If you want to gain the English market, you must suit it, and it will give you fair play.

### OATS.

Oats have been imported into Great Britain in 1891 to the value of $26,648,572. The Liverpool price has been from 50 to 55 cents, and the Toronto price about 34 cents, leaving a bare margin for profitable export.

### PEASE.

Pease were imported into Great Britain in 1891 to the value of $4,197,144. During the year ending 30th June, 1891, Canada sent to England pease to the value of $1,485,348. They have been selling in Liverpool at about 90 cents, and in Toronto at about 60 cents. Other varieties, like the Prussian Blue and Marrowfat, will sell at a higher price per bushel.

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APPLES.

I have here the particulars of prices obtained for Canadian "Baldwins" in the Liverpool market during the present season. Based on sound No. 1 stock, the average price was 16s. 4d. a barrel, or about $4. The average transportation charges are from 90 cents to $1.10 per barrel. I have a chart here, showing the relative position for 4 years of the Canadian apples, showing how the Canadian "Baldwins" compare with New York, Maine and Boston "Baldwins." The chart shows that the Canadian Baldwins have been getting the highest prices going. That means that we have obtained the preference of the English purchaser, which I think a very important matter. Mr. John Dyke, Canadian Government agent at Liverpool, writes as follows:—

"The Canadian barrels are somewhat larger than those from the United States, but the quality of the Canadian fruit stands superior to any other apple imported into England. The particular varieties received from Canada are 'Baldwins' 'Greenings,' 'Northern Spy,' 'Kings,' 'Russets.'

"'Baldwins' are the apples in greatest demand, and the lowest average price for No. 1 sound stock this season has been 14s. 6d., whilst the highest average has been 20s. per barrel. Later in the season 'Russets' arrived here, and being a keeping apple, it has the entire control of the market. 'Kings' realize very good prices, but the quantities received are small. It is difficult to make a comparison between one season and another, as the crop varies very considerably. It is rarely that two big crops come in successive years, so that to compare the prices of this with last year is scarcely fair; but, as will be seen from the prices quoted, high rates are being obtained, notwithstanding the quantity received, and there is no doubt that the results have been very remunerative to shippers. The imports this season have been in excess of anything before recorded, but the quality has been excellent, and there is practically no limit to the demand for Canadian fruit of this quality and condition.

"The English apple, generally speaking, is not of a keeping quality, and is mostly disposed of by the time the Canadian winter stock arrives here—say the middle of October. After that date the English fruit is not a factor in the competition at all. The freight from any part of Ontario to Liverpool will not average more than $1 per barrel."

I have taken a good deal of your time. The subject as to the possibility of selling Canadian farm products at a profit in the English market has not been presented as concisely to you as it would have been if I had had more time for preparation; but I have to thank you for your kind indulgence. The object has been to whet your perceptions, clear away some mists that gather around men's opinions when their information is imperfect, and lead you to the formation of a sound judgment and profitable practice. I have touched upon the economical aspects only. Besides, there is the patriotic and national aspect, which means a good deal to most men. I have hope for and faith in the future of my own country, and I have confidence in the capabilities of my own business of farming to render the farmers every desirable service. I am confident that the English market is able to give us such prices for our products as to leave a living profit, a leisure for workers, and enough of a balance to make Canadians the most prosperous, contented and happy people who follow farming anywhere on the earth.

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THE ECONOMIC FEEDING VALUE OF ENSILAGE.

*(Report of an Address delivered before the Convention of the Ensilage and Economic Cattle-Feeding Association of Central Canada, at Montreal).*

Professor Robertson said:—

MR. PRESIDENT AND GENTLEMEN,—When I was asked to assist at the first convention of an ensilage association, I had some doubts as to the propriety and wisdom



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of adding another association to the many which exist in Canada, to look after the interests of the farmers; but the more I have thought over the subject, and the more I have learned of the efforts of the men who have taken this in hand, the more convinced I am that there is room for this association, to help on the good work of making farming pay better in our Dominion.

I am very glad to learn from the opening address of the president that the aims of this association are so practical. A good many associations with very pretentious names are formed for the purpose of booming the popularity of a few men, or of enriching the pockets of a few men; but an association like this has the broad and worthy object of helping the ordinary farmer to do his work much better, so that he may be better off. I am glad that Montreal, in this year of grace, eighteen hundred and ninety-two, has taken some special interest in disseminating information through the agency of an association located in its midst for the benefit of the farmers. I want to tell you that Toronto has been ahead of Montreal in this respect, and I know you love Toronto so well that you will be glad to hear that news.

After the association was formed and I was asked to give an address, I was told, in confidence, that my address was not to be an apology for the existence of the association, but an exposition of the intentions, objects and capabilities of the association to give the farmers information on a most important subject.

I think these meetings in themselves are full of great possibility for farmers. Farmers, more than most men, are very easily discouraged in their work, and they have more to discourage them than most men. When they find their calling neglected by the men who have opportunities for wide observation, they begin to belittle its importance and to have scant respect for it. As soon as a man fails to feel an invigorating, almost indefinable enthusiasm for his work, just so soon are his powers to perform his work weakened. Every such association, supported by the business men and professional men, which looks after the farmers' interests, puts new hope in their hearts; and that is worth more to them than loads of information.

A convention like this is capable of furnishing information which we all need, and capable of engendering enthusiasm, which most of us need. I can read on a printed page all the information which I may obtain at this meeting; but there is an enthusiasm in a meeting which does not come from a printed page; and the more these meetings are held, the more farmers will be able to do their work well with a hearty spirit.

There are few subjects relating to agriculture that have so much interest, and in themselves so much importance, as the economical feeding of stock; and there are not many subjects, with which farmers should be acquainted, of which they know so little as the most economical way of feeding the cattle they keep.

My object in bringing so much dry goods to the meeting (charts) is only to give an object lesson on the most economical way of feeding the cattle on the farms of Canada.

A good many men farm, without thinking clearly as to the objects of agriculture. Men farm as they follow business, to make money, so I have been told. Possibly in Montreal they do not want to make money; they come from the Scotch stock, which has no inclination that way; but a few of the French people have set them an example in seeking the almighty dollar.

In following farming to make money, the farmer must remember that he has a three-fold task to perform,—first, to make money by providing food; second, to make money by maintaining the fertility of his fields, so that he will have some stock-in-trade to go on with in business in future years; and third, to make money by giving occupation to men for twelve months, and not for only six in the year. These three objects are the furnishing of food for the people, the maintaining of the fertility of the soil, and the giving of occupation at paying wages during the whole year. That system of farming implies the keeping of large herds of cattle on all the farms in Canada. To provide food only in the form of cereals means the exhaustion of the soil; it means occupation—so far as pay is concerned—for six months of the year, with six months of living on the income of the previous six months.

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Now let me show you one chart, to illustrate the exhaustion of the soil consequent on this method of agriculture. In all farming—cultivation of the soil for the obtaining of food—the crops which grow on the fields take out of the soil three substances which are becoming rather scarce in our Dominion. As far as land is depleted of these substances it becomes a barren waste; and as it contains these substances in available condition, it is capable of giving back large crops in return for the smallest outlay. These three substances are nitrogen, phosphoric acid and potash.

A man in selling crops and products sells portions of these three things out of his fields. The drift of this address is to prove to you that feeding stock with ensilage does not take these from the farms in large quantities, and still does furnish these things for human food in large quantities—it is a paradox, but capable of demonstration.

Every ton of wheat carries forty-one pounds of nitrogen, fifteen pounds of phosphoric acid and ten pounds of potash. Pease and beans belong to the class of plants which have the faculty of appropriating most of the nitrogen from the atmosphere; therefore, while the sale of them carries a large proportion of nitrogen off the farm, the growth of them fixes nitrogen from the air. That is the advantage of growing pease as a fertilizing crop, instead of oats or buckwheat.

Nitrogen, phosphoric acid and potash in one ton each:

| | Nitrogen. Lb. | Phosphoric Acid. Lb. | Potash. Lb. |
|---|---|---|---|
| Wheat | 41·6 | 15·6 | 10·4 |
| Barley | 32 | 15·4 | 9 |
| Oats | 38·4 | 12·4 | 8·8 |
| Pease | 70·6 | 17·2 | 19·6 |
| Beans | 81·6 | 23·8 | 26·2 |
| Indian corn | 32 | 11·8 | 7·4 |
| Hay | 31 | 8·2 | 26·4 |
| Clover | 39·4 | 11·2 | 36·8 |
| Potatoes | 6·8 | 3·2 | 11·4 |
| Fat cattle—alive | 50 | 31·2 | 2·8 |
| Fat sheep—alive | 44 | 22·6 | 2·8 |
| Fat swine—alive | 34·8 | 14·6 | 2 |
| Cheese | 90 | 23 | 5 |
| Milk | 10·2 | 3·4 | 3 |
| Fine butter | ·5 | ... | ... |

Every 3 tons of hay will carry more off a farmer's land than 2 tons of fat cattle; and for 3 tons of hay he will get on an average $30, while for 2 tons of fat cattle he will get $200. By the hay method of farming he gets $30 from the same quantity of these elements of fertility as he gets $200 from when he grows and sells fat cattle.

If he be content with $800 a year from his farm, he will have to sell four times $200 worth of cattle to get $800; and if he wants to get $800 by selling hay, he will sell seven times more of these elements of fertility.

In selling swine, cheese, milk or fine butter, he sells a less quantity of valuable constituents out of his land than in selling hay. Hay is worth $10 a ton; good butter, in winter time, is worth $500 a ton. The ton of hay takes some 87 times more of the elements of fertility out of the soil than the butter does.

A farmer can make butter through ensilage with the largest profit at the smallest cost; and, instead of growing hay, he can grow corn, sell butter and get a far larger income. That is all I have to say in regard to this chart in the meantime.

For the economical feeding of animals, every man who keeps stock should learn something of the underlying principles of his practice.

Before proceeding with a further discussion of the subject of feeding, I shall introduce here a paper prepared by Mr. Frank T. Shutt, Chief Chemist at the

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Central Experimental Farm, which points out briefly the nature and functions of the constituents of fodders in general. Mr. Shutt says:—

"All fodders may be said to consist of varying quantities of (1) water, (2) ash, (3) albuminoids, (4) fat, (5) fibre and (6) carbo-hydrates.

"*Water*—exists in large amounts, often as high as 90 per cent, in all vegetable substances. Though as necessary for animals as the air they breathe or the dry substance of the plants they eat, it cannot be said to have any nutritive or commercial value in a fodder. When a fodder is thoroughly dried it loses its water or moisture, and what is left is known as the dry substance. The larger the percentage of water, the smaller the percentage of dry matter, and *vice versa*. Hence, if two plants differ only in the relative amounts of water they contain, the one possessing less water will be the more nutritious, and consequently the more valuable of the two. Green and succulent fodders are often eaten by cattle more greedily and with greater relish than drier ones; nevertheless, if the dry matter in the latter has undergone no change to impair its digestibility, the foregoing statement holds true. Plants absorb water by means of their roots from the soil.

"*Ash*—is the mineral or inorganic part of the plant, and consists chiefly of lime, magnesia, potash and iron, combined with phosphoric, sulphuric and hydrochloric acids. When a plant is burnt, it is the ash alone that remains. The plant obtains its mineral matter or ash from the soil, where it must exist in solution in order that its absorption by the roots may take place. In the animal it contributes chiefly to the formation of bone, and supplies the tissues throughout the body with the minute quantity of mineral matter they possess. As all plants contain sufficient ash for these purposes, it receives no special value when considering the relative value of a fodder.

"When the amounts of water and ash are subtracted, that which remains is organic matter, and consists of several classes of constituents now to be discussed.

"*Albuminoids.*—This is a collective name used to designate a class of organic substances, which in a chemical sense resemble albumen (white of egg), and consequently possess nitrogen in addition to carbon, oxygen and hydrogen. The terms 'crude protein,' 'proteids' and 'nitrogenous matter' are used by some authors to denote the same bodies. The albuminoids are found alike in the vegetable and animal kingdoms, and all possess a similar composition, containing in the neighbourhood of 16 per cent of nitrogen, the remaining 84 per cent consisting of carbon, hydrogen and oxygen. Though similar in composition, they differ widely as to their physical characteristics, as the following examples will show: Casein or curd in milk; fibrin—that which is left behind after washing the blood out of lean meat; gluten—that which gives wheaten dough its tenacity; and vegetable casein as found in nearly all plants to a greater or less extent, but more especially developed in the seeds of the leguminosæ (pease, beans, &c.) With the exception of the latter order of plants, the soil forms the sole source of nitrogen for all farm crops. The leguminosæ after they have reached a certain stage of growth obtain most of their nitrogen from the atmosphere, converting it into albuminoids within their tissues.

"The albuminoids are the most valuable for fodder purposes of all plant ingredients. They serve largely to form the blood, muscle and milk, and at the same time assist in generating the heat and energy necessary for the animal to live and to do work. The albuminoids in a fodder are calculated by multiplying the nitrogen found by 6·25—since, as before stated, these bodies possess 16 per cent of nitrogen.

"There are other nitrogenous bodies present in growing plants, known as amides. Their value as food has not as yet been accurately determined, but it is supposed to be somewhat lower than that of the albuminoids. As the plant matures, the amides become converted into albuminoids, the former having acted during the stages of vigorous growth as carriers within the plant of nitrogen in a soluble form. These substances are present in but comparatively small quantities, and hence they have been classed with the alluminoids in this work.

"The organic matter of a plant consists of a nitrogenous part and a non-nitrogenous part. The first having already been dealt with under the name albuminoids, the latter must now receive our attention."

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NON-NITROGENOUS ORGANIC MATTER.

"Three distinct classes of substances fall under the head "non-nitrogenous," viz., fat or oil, fibre or cellulose and carbo-hydrates. These three consist entirely of carbon, oxygen and hydrogen in varying proportions. The plant has built them up in its tissues from the atmosphere with the aid of warmth, moisture and sunlight. Their functions in the animal are the formation of fat and the supplying of material for the combustion always going on as long as the animal lives. The result of this combustion or burning up of the non-nitrogenous organic matter in the animal by the oxygen of the air it breaths is the production of heat and energy whereby the animal is enabled to live and work.

"*Fat or Oil*—has the highest value as food among the non-nitrogenous constituents of a fodder. Weight for weight, it is reckoned 2½ times more valuable than the fibre and carbo-hydrates. It contains more carbon than either of the latter, and hence is capable of generating more heat and energy in the animal. The animal is able to partially transform vegetable fat or oil into fat in its own tissues. Together with the fat is estimated the small amount of chlorophyll—the green colouring matter of plants—hence the term 'crude fat' sometimes used.

"*Fibre*—sometimes termed cellulose, is the woody part of a plant or fodder. Its function has been explained in speaking generally of the non-nitrogenous matter. It has a *low* nutritive value compared with fat or the carbo-hydrates, and as but a part of it is digested in the animal it is counted of least worth of all fodder constituents. Speaking generally, the fibre becomes harder and less digestible as the plant reaches maturity.

*Carbo-hydrates*—also known as nitrogen, free extract matter, consist mainly of starch and sugar, together with small quantities of gum, &c. They form by far the greater portion of the organic matter of plants, and may be supposed to consist of carbon and the elements of water—oxygen and hydrogen. They chiefly serve in the animal as generators of heat and energy.

"The following scheme in tabular form may assist in making clear what has already been said regarding the classification of the several constituents of fodders:

| | | | |
|---|---|---|---|
| Inorganic or mineral..... ... ..... ..... | | | Ash |
| Organic | Nitrogenous..... | Albuminoids, | |
| | | Amides, | |
| | Non-nitrogenous . | Fat, | |
| | | Fibre, | |
| | | Carbo-hydrates. | |

"*Percentage of Digestibility.*—It is well known that all the food eaten by animals is not digested—that is, that some part of it is voided in the solid excreta.

"By careful and repeated experiments, it has been ascertained what proportions of the various constituents of many fodders are digested, *i. e.*, go to form new blood and tissues, or are used to develop heat and energy in the healthy animal. The proportions digested vary for the different ingredients of a fodder, and are not the same for all animals. Thus there may be a larger percentage of the albuminoids digestible in bran than in corn meal when fed to the cow, and the case may be reversed with the pig. Again the fibre in corn fodder may to a greater extent be capable of digestion in all animals than that in wheat straw. Before our knowledge in this matter is complete, much work is yet required to be done, although much has already been accomplished in this direction, especially in Germany.

"The percentages of digestibility of the different constituents of corn fodder and ensilage, supposing them to be alike in both, are as follows:—

| | | | |
|---|---|---|---|
| Albuminoids..... ... | 73 | Fat..... ..... | 75 |
| Fibre..... | 72 | Carbo-hydrates..... | 67 |

"*Nutritive Ratio.*—This is the ratio or proportion between the digestible albuminoids of a fodder and the sum of the digestible fat, fibre and carbo-hydrates, or in other words, between the nitrogenous and the non-nitrogenous portions of a fodder."

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"It has already been stated that fat is considered 2½ times more valuable as a food than fibre and the carbo-hydrates; the *ratio therefore is between the amount of digestible albuminoids and the sum of the digestible fibre and carbo-hydrates plus 2½ times the amount of digestible fat.*"

Having now learned from Mr. Shutt's paper the nature of those constituent parts of feeding stuffs, which are termed albuminoids, fat, carbo-hydrates and ash, I shall present a chart which shows the composition of the bodies of animals which are commonly fed and fattened upon the farms.

COMPOSITION OF BODIES.

| | Water. | Albuminoids. | Fat. | Ash. |
|---|---|---|---|---|
| Ox (half-fattened) per cent | 51·5 | 16·6 | 19·1 | 4·66 |
| do (fat) do | 45·5 | 14·5 | 30·1 | 3·92 |
| Sheep (lean) do | 57·3 | 14·8 | 18·7 | 3·16 |
| do (fat) do | 43·4 | 12·2 | 35·6 | 2·81 |
| Swine (lean) do | 55·1 | 13·7 | 23·3 | 2·67 |
| do (fat) do | 41.3 | 10·9 | 42·2 | 1·65 |

In selling a half-fattened ox, a farmer sells more of the expensive part of the fertility of his soil, and gets a lower price for the whole carcass than if he makes the animal fully fat. You can sell the water—the water which forms part of his flesh—for five cents a pound in a fat ox and three and a half cents in a half-fatted ox, or fifty dollars against thirty-five dollars for the same weight of an animal. Fat swine carry less off the land than lean swine. The farmer who markets lean stock sells off the wealth of his fields, and gets less for it.

I am trying to give you an object lesson, so that you will remember the principle, if you do not remember at all the figures which I mention.

In feeding oxen on ensilage or other substances, and in feeding all other animals, it is necessary that they should receive a certain amount of albuminoids, a certain proportion of fat, and a certain proportion of carbo-hydrates which go to furnish heat.

A long series of experimental work in many stations has brought the fact to light, that certain animals require certain quantities of these things. Take this for illustration:—In the fattening of oxen the standard says, they should receive two and a-half pounds of digestible albuminoids or nitrogenous matter per day, fifteen pounds of carbo-hydrates—gum starch, sugar and fibre—and half a pound of fat. We fed three lots of steers last winter—I did not plan to conform to this chart. I did not have any particular intention of conforming to this chart in my practice. I was trying to discover whether it was cheaper to feed animals on hay, roots and meal, or on corn ensilage and meal. The experiment lasted five months, and when I came to make up the exact quantity of these constituents, which the steers consumed, I found that those which were fed on corn ensilage and six pounds of meal per day had consumed the quantities mentioned in the standards for feeding rations, or so near them that the difference is not worth mentioning. The steers on hay, roots and meal cost 19·23 cents per head per day, or nearly 19¼ cents; the cost of the steers fed on the corn ensilage and meal was 11·90 or 19¼ cents against less than 12 cents per day; and the steers on the ensilage gained thirty-three pounds each more in the same time than the others. Now, you see the economy of feeding ensilage, apart from the standards, and also confirmatory of the standards.

I am going to exhibit this chart for the purpose of showing the proportion of these different constituents in every pound of certain ordinary feeding substances. I put wheat as a feeding substance, because in Canada we may be compelled, in my humble opinion, to feed a large quantity of wheat to our stock. We have large districts where wheat gets frozen occasionally, and we are now feeding frozen wheat to

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swine—very badly frozen wheat—and getting over 15 pounds of increase in live weight for every bushel. There is a possibility of making money from feeding ensilage and frozen wheat. Combined with corn ensilage it makes capital feed for steers.

QUANTITIES of Digestible Protein, Carbo-hydrates and Fat, in each pound of certain Feeds, from tests with ruminants—(Oxen and Cows.)

| —— | Total Dry Organic Matter. | Digestible Protein. | Digestible Carbo-hydrates. | Digestible Fat. |
|---|---|---|---|---|
| | Lb. | Lb. | Lb. | Lb. |
| Wheat.....1 lb. | ·89 | ·095 | ·588 | ·014 |
| Barley..... do | ·89 | ·094 | ·600 | ·026 |
| Oats..... do | ·87 | ·080 | ·440 | ·044 |
| Pease..... do | ·87 | ·201 | ·534 | ·029 |
| Oilcake..... do | ·92 | ·283 | 368 | ·050 |
| Cotton-seed meal..... do | ·92 | ·336 | ·264 | ·070 |
| Wheat bran..... do | ·87 | ·117 | ·453 | ·027 |
| Mixed straw (wheat, barley, oat)..... do | ·85 | ·035 | ·330 | ·004 |
| Mixed hay..... do | ·86 | ·051 | ·430 | ·012 |
| Corn ensilage..... do | ·25 | ·016 | ·230 | ·006 |
| Corn stover..... do | ·48 | ·033 | ·480 | ·008 |
| Turnips..... do | ·085 | ·010 | ·075 | ·001 |
| Mangels..... do | ·120 | ·011 | ·100 | ·001 |
| Carrots..... do | ·141 | ·013 | ·115 | ·002 |
| Sugar beets..... do | ·185 | ·010 | ·167 | ·001 |

Your president said that the Hon. Minister of Agriculture, the Hon. Mr. Beaubien, had provided for a stenographic report of this meeting. I have this chart here, so that you will have it in the report for studious examination afterwards. In that respect, also, I think the association is most happily launched in its course of service for the farmers, inasmuch as the Hon. the Minister of Agriculture has extended his patronage to it; and he is one of the first and largest feeders of ensilage in the province, and one of the strongest advocates in support of the practice. The next question which comes up in connection with this subject is the economical making of ensilage.

Since a farmer must obtain these things, which I have indicated so often—the albuminoids, fat and carbo-hydrates—to feed his animals, and since he can obtain them in all the different farm products mentioned in the table, it becomes a matter of great importance to the farmer to know where he can find them cheapest. He can find these things—albuminoids, fat and carbo-hydrates—from strawberries down to corn stalks; but he must study where he can find them cheapest, because you can see that the success of a man's feeding depends largely on the cost of his raw material. Any man in business knows how easy it is to sell at a profit goods that are bought right; and how hard it is to make a profit in any market on goods that are bought wrong. A farmer buys, you may say, from his fields the raw material he gives his animals. There is no plant that can be grown on farms in Canada to-day that will furnish these constituents—albuminoids, fat and carbo-hydrates—for the feeding of animals, as cheap as the corn plant. In hay, oats, pease, barley and wheat, you can obtain the same constituents, but they cost so much higher that the man who feeds these things gets a less profit than the man who feeds them from corn-stalks. I will illustrate: the major part of the animal's food is carbo-hydrates, which keep it warm in our cold climate; these are found most palatable and digestible in sugar, gum and starch. The corn-stalk has the faculty of appropriating these things from the air, when exposed to sunlight and grown in a field where the plants have room.

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While near Montreal last autumn I saw fields of corn, where the men had wantonly thrown away 2½ bushels of seed to the acre—perhaps they were benevolently inclined towards Mr. Ewing or other seedsmen. When the corn-stalk has not room enough the green colouring matter is less active, and does not take in the carbon for the gum, starch and sugar. The corn-stalk serves the farmer in proportion as he gives it a chance—rich, warm soil and plenty of room.

This chart is for the purpose showing you the comparative value of corn-stalks cut on the 25th August and the 19th of September. It is taken from the work of Mr. Frank T. Shutt, chemist at the Central Experimental Farm. When cut on the 25th of August every ton of the crop had of digestible matter 249 pounds; when cut on the 19th September every ton of the crop contained 297 pounds of digestible matter.

INDIAN CORN—Digestible Matter per ton of Green Fodder.

| | | Cut. | Lb. | Value. |
|---|---|---|---|---|
| Average of 7 Varieties. | Total digestible matter. | August 25 | 249 | |
| | | September 19 | 297 | |
| | Albuminoids | August 26 | 25 | |
| | | September 19 | 27 | |
| | Fat | August 26 | 3 | |
| | | September 19 | 5 | |
| | Fibre | August 26 | 77 | |
| | | September 19 | 89 | |
| | Carbo-hydrates | August 26 | 143 | |
| | | September 19 | 175 | |

In every ton of green fodder there were in the first stage 249 lb. of digestible matter, and in every ton at the other stage there were 297 lb. These are the constituents: Albuminoids, fat, fibre and carbo-hydrates. Of these the albuminoids are the most valuable constituents, corresponding to the fibrin of beef or the albumen of eggs. At the first period there were 25 lb. of albuminoids as against 27 in the latter. Of fat there were 3 lb., as against 5 lb.; of fibre the proportion was 77 to 89; of the carbo-hydrates there were 143 against 175. The teaching of the whole thing is, that every ton is worth more at the latter stage, and you have more tons to the acre. This lower chart will illustrate these points still more clearly. It is taken from the average of five varieties of Indian corn at these stages.

INDIAN CORN—YIELDS PER ACRE:—

| | Lb. | |
|---|---|---|
| Tasselled, July 30. | 18,045 | Green weight. |
| | 16,426 | Water. |
| | 1,619 | Dry matter. |
| Silked, August 9. | 25,745 | Green weight. |
| | 22,666 | Water. |
| | 3,079 | Dry matter. |
| In milk, August 21. | 32,650 | Green weight. |
| | 27,957 | Water. |
| | 4,693 | Dry matter. |
| Glazed, Sept. 7. | 32,295 | Green weight. |
| | 25,093 | Water. |
| | 7,202 | Dry matter. |
| Ripe, Sept. 23. | 28,460 | Green weight. |
| | 20,542 | Water. |
| | 7,918 | Dry matter. |

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Most of the gentlemen of the convention will understand that there are several distinct stages in corn growth. For the sake of convenience we speak of the later stages in the following terms:—First we have the "tasselling;" then you have the "silking," when the silk threads come through the husk; then there is the stage when the corn is "in milk"; after that is the stage when the kernel is "glazed" on the outside; and lastly you have the "ripe" stage, when the plant is matured. At the "tasselled" stage there were 18,045 lb., of green corn to the acre. In these 9 tons and 45 pounds there were 8 tons and 426 lb. of water; so that we had only 1,619 pounds of dry matter. The dry matter is all that is valuable. It is not equally digestible in all its stages, but still it must be there to be available. At the "silking" stage there was great increase in the dry matter, and so all through, as shown by the diagram in the chart. If you put it down in dollars and cents, the difference would be this: that if it be said to be worth $16.19 per acre at the first or "tasselling" stage, the same crop is worth $72.02 per acre at the latter or "glazed" stage, and there is no increase in the cost of production per acre between that stage and this. The man does not put an extra ten cents to the acre. The extra digestible constituents are largely taken from the atmosphere. So you will see the great importance of growing corn for ensilage purposes to the "glazed" stage. We have been urging everywhere, for the last two years, that farmers should grow corn so that it may reach this stage.

The corn at the "glazing" stage has the largest quantity of food value in itself, and it is then in the most digestible condition.

In our work on the Experimental Farm in 1891, we compared four varieties of corn—"Thoroughbred White Flint," "Red Cob," "Longfellow," and "Pearce's Prolific." At the "tasselling" stage we realized per acre of dry matter—not all digestible—but dry matter, 6,468 lb. We realized at the "silking" period from the same varieties 7,770 lb. At the "early milk" stage we realized 9,138 lb.; at the "late milk" stage, 9,467 lb.; and at the "glazing" stage, 11,298 lbs. I want to read these figures to you to make an impression on your mind with regard to the advantage of cutting at the late stage. There was nearly double as much dry matter per acre at the "glazing" stage as at the "tasselling" stage, and you cannot get corn to the "glazing" stage by sowing it broadcast.

I wish to give a further illustration, by taking Indian corn on an average of five trials. The stage of growth from 24th July to 5th August, at different experimental stations, reached the condition from the "tasselled" stage to the "bloom" stage. First we may take the quantity of dry matter per acre at these two stages. The diagram that I have prepared to illustrate these points is as follows.—

| | | | | |
|---|---|---|---|---|
| 24th July to 5th Aug. | Tasselled to bloom. | Dry matter..... | 10 | inches long. |
| | | Albuminoids..... | 10 | do |
| | | Fat ..... | 10 | do |
| | | Carbo-hydrates.... | 10 | do |
| 3rd Sept. to 23rd Sept. | Glazed to ripe. | Dry matter..... | 30·5 | do |
| | | Albuminoids..... | 21·4 | do |
| | | Fat..... | 33 | do |
| | | Carbo-hydrates.... | 36·5 | do |

I need hardly emphasize still further the fact that no additional expense is involved in producing a crop to the later or glazed stage; the work is all done and the outlay has all been made before the crop reaches the tasselling period.

The silo will not grow a crop of corn. If you put it at the "glazing" into the silo, it will give you a large quantity of feed, but at the "tasselling" stage it will give you an expensive way of watering cows.

I fear I have encroached on the time of the other speakers, but I wanted to show you that ensilage is the cheapest feed for cattle, and also to show you how this association might help the prosperity of Canada, by instructing farmers how to make ensilage in the best way. I will give you a few more words on the feeding value of it. I have given you one instance from the feeding experiments which I

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quoted. We have been carrying on a series of extensive experiments this winter, which are not yet completed. I made an examination of the books the other day, and I found this to be the teaching of the experiment this year—that in feeding steers on a corn ensilage ration as against a hay and roots ration, for one quarter less cost we get one quarter more gain in weight. In both cases an equal quantity of meal was put with the fodder ration.

Question by a member.—What price do you put on the hay in making your estimate?

Prof. Robertson.—Eight dollars per ton. I am putting ensilage at $2 per ton, but most men in the vicinity of the city here can make it for $1.25 per ton. In our feeding tests during the winter of 1890–91 I reckoned the ensilage at what it cost, namely, $1.40 per ton. When the corn was put in the silos, in 1890, it had been wilted on the average for two days. The shrinkage in the weight and also damage to the crop from a hailstorm caused the ensilage to cost more per ton. Hence, it has been valued in our feeding tests during the winter of 1891–92 at cost, viz., $2 per ton.

One other advantage of the feeding of ensilage has been overlooked, and it is this: By feeding cows with ensilage it is possible to have winter dairying in our cold climate, and that means an income from our cows the whole year round; it means the possibility of feeding milking cows with not more than 6 lb. of meal per day. In feeding eighteen cows in groups of three, I do not find any gain from feeding over 8 pounds of meal per head per day, but I find farmers around Montreal feeding 12, 15 and 16 lb. per head per day—an extra cost of 8 cents per day, with no more milk returns. As soon as we feed over 8 lb. of meal per day we make the milk richer in colour, but no richer in percentage of constituents. Thus you see with ensilage you can get more value in product with less cost per day.

The magnitude of this cattle trade does not come within the comprehension of the ordinary farmer or business man. Last year from this port of Montreal there were handled about 4,000 carloads of cheese, which represented millions of dollars. The value of the cheese exported last year was over 9½ millions of dollars; the value of the butter exported was about six hundred and two thousand dollars; and there was not a tub of that butter made after November, so far as I know. This year we started two creameries by altering cheese factories into creameries, and we made shipments for the first time of that class of butter to Europe—most of it from cows fed on fodder corn. The latest report I had was that the butter was fetching 124 shillings per cwt.

In Western Ontario we may have next winter 25 creameries running all winter, wholly due to the corn crop and the use of ensilage. We can have in 10 years' time as large a value in butter exported as of cheese, by growing corn and feeding ensilage; and if Montreal could handle $10,000,000 worth of butter and $15,000,000 worth of cheese, it would be beneficial to the wholesale trade and every other line of business. Then, in live stock, last year Canada exported 108,000 head of cattle, of a value of $8,623,202. It is possible to feed more than twice as many animals on the same farm, by growing corn for ensilage, instead of growing hay. The tremendous possibility of this is apparent, if you take the figures in regard to the keeping of animals that are dry, the keeping of animals that are being fattened, and the keeping of those which are giving milk, and calculate the possible reduction in the cost of the wintering of cattle in Canada for one year—I mean from November till the end of April—by the feeding of ensilage. The actual saving would amount this year, if corn ensilage without hay were fed, to $19,000,000 in the Dominion of Canada.

Now in the export of agricultural products we might send abroad $42,000,000 worth annually, but if we shall save the $19,000,000 that can be saved by feeding ensilage, we will find the farmers better off, and they shall have a large proportion of the profits which now remain with the merchants.

One more point,—by winter dairying it is possible to extend our trade in swine, and in this climate, with the best conditions for the growing and curing of fine bacon, we could send to England as much bacon as cheese. I see a large possibility of a bacon trade in the North-West, which has the best climate for growing animals

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and curing meats. If the people of Quebec do not take it up the people of Manitoba will, and will market the grain in the form of concentrated products and get the best profit for themselves.

In winter dairying it is possible to raise little pigs during the winter, and these little pigs raised on skim-milk and buttermilk can be marketed to advantage at 6 and 8 months old. No matter how you look at it, the growing of corn and the feeding of ensilage will enlarge a farmer's output and multiply his profits. Five acres of corn made into ensilage will keep fifteen cows in splendid condition, so far as fodder is needed, all winter.

The small farmer, the man who has been neglected, the man who says "the big farmer can keep stock and make money, but I cannot," can so enlarge his output through feeding corn ensilage as to have on a small farm a large profit and small expense.

The growth of corn and the making of ensilage is capable of the best service to the farmers, and every farmer's prosperity is a measure of prosperity to every good citizen of the country. Canada can make gains from the growing of corn and the making of ensilage; and your association in my opinion is deserving of the most hearty support.

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### (4) THE RELATION OF AGRICULTURE TO PROGRESS IN THE DEVELOPMENT OF CANADIAN LIFE.

*(Report of an Address before the Ensilage Convention in Montreal.)*

Mr. Robertson said:—

MR. PRESIDENT AND GENTLEMEN,—I am very glad that the Ensilage and Economic Cattle Feeding Association of Central Canada has found a place for its convention in the city of Montreal. Montreal's position as a commercial metropolis of Canada gives it a special advantage as the centre from which to disseminate information that will help the agriculturists who live in its immediate vicinity, and also in the most distant parts of our wide Dominion.

The newspapers of this city are to be complimented upon the attention which they have devoted of late years to agricultural topics. Through the wide circulation which the leading journals here have obtained and the excellent reputation they have won, whatever appears in their columns is read with a large degree of confidence by many farmers; and newspapers elsewhere in the Dominion copy readily from their issues.

I trust that this association will have a happy development in occupying the largest possible sphere of usefulness among the many associations which exist mainly for the improvement of agricultural products.

If I might express a modest wish on behalf of this foundling among agricultural associations, I would say that I hope it will live to attain among them as ample proportions as its respected paternal author has among men.

I expect from it also the utmost service within a wide sphere, and hope that its sphere will continually enlarge, until farmers everywhere, who keep cattle, fall into the habit of growing enough corn for ensilage for the economic feeding of their stock. The discussion which has just been closed has informed me of one other fact in regard to which I needed some correction. In expressing a preference for Montreal as a meeting place for this association's convention, the saying was used: "Since the mountain cannot go to Mahomet, Mahomet must come to the mountain," and hence the inference was left that the farmers of the surrounding country must come to the mountain of Montreal. I have been accustomed to speak of the elevation of land behind your beautiful city as "a hill,' and such it always seemed to me; but I will not again offend against the tender susceptibilities of Montreal people by speaking of it otherwise than as "a mountain."

Many of the leading men to whom Montreal owes much of its commercial prosperity forget to remember the source from which that prosperity is drawn.

The vast warehouses which line your business streets, the extensive wharves which present such scenes of bustling activity during the shipping season, owe their

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existence to the handling of large quantities of farm products. If these can be multiplied in quantity and increased in value, every handler, every business man will have a better chance to enlarge his business and increase his profits. The wholesale business trade of Montreal ultimately depends on the great mass of consuming farmers for the purchase of their goods and wares. The dry goods merchant, the hardware merchant, the agricultural implement dealer, the seed merchant, and nearly every other branch of commercial enterprise in Montreal respond speedily to good times among the farmers.

If the remittances from the stores in the country districts come in slowly the bankers and professional men will also find financial stringency and difficulty in carrying on their business with success. Montreal is perhaps the latest among all the large cities to manifest in some concrete and public manner its interest in the welfare of the farmers, who after all furnish the bone and sinew for its commercial enterprises, and Montreal has this substantial quality of business in its midst—its progress has been gradual, solid and real. Cities in our country which grow upon the establishment of ventures and transactions, which have little of the real wealth of the country in them or behind them, are subject to great booms and depressions. Western cities are noted for their adhesion to the sentiment which they have paraphrased from Tennyson's "In Memoriam"; and they say: "It is better to be boomed and bu'st, than never to be boomed at all."

As the citizens of Montreal recognize their dependence upon the farmers of the country, and lend what assistance they can to improve their condition, so far will they remove from themselves all probability of commercial depression. Toronto has set Montreal a good example in the development of associations with their locus there for the improvement of agriculture; and I dare say that the ardent tenderness which Montreal entertains for her sister city will stimulate her to copy her good example in this regard.

In the study of the relation which agriculture sustains to the condition of society which we call "highly civilized life," we must bear in mind that the farmers furnish most of those things which outwardly distinguish the civilized citizen from the rude barbarian. In the minds of very many men, the difference between the highly civilized citizen and another individual consists largely in the quality and kind of the clothes that are worn and the food which is eaten. The raw material for the clothing of the people comes from the farms. From the woollen goods for coats to the silken neckties, the raw material is the product of living creatures fed upon plant products; and the production of such things is the aim of all modern and intelligent agriculture. In the march of progress, the agriculturists have not been lagging behind, but have been leading the race and community to higher attainments. The food of the people also comes from farms, and good living in this sense, provided by skilful farming, means good living in many other senses also.

When farmers furnish an abundance of nutritious food at a low cost of production it is well within the reach of more people; and when a community is well fed, even to its poorest members, it is strong for all the activities and claims of our wearing life. The importance of agriculture to the commercial enterprises of our country is easily noticed by observing how sensitive they all are to the condition of the farmers. When hard times prevail in rural districts, depression follows in every centre of manufacturing and commercial endeavour.

The success of farmers, which means for them good times, comes mainly from good crops; good crops depend mainly upon good cultivation, the use of good seed, the exercise of good management and the prevalence of good weather.

In nine seasons out of ten, in Canada, the weather is quite favourable for the production of good crops; the other factors are well within control of the intelligent farmer. The want of knowledge about his own business and the want of interest in the methods whereby he can improve his productions are perhaps among the main difficulties that afflict agriculture at the present time. Associations such as this, conventions such as the present, are means whereby these ailments of the farmer and farming can be cured.

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The magnitude of the interest of agriculture might be set before you in statistics that would bewilder you and not serve you much afterwards. Instead of adopting that plan to present to your mind a view of its greatness, I would prefer to take you on an imaginary trip across the continent to indicate very briefly the vast agricultural resources of this country, and to point out that upon agriculture the largest part of our population depends for a living.

At present there are some twenty-five million acres of land under cultivation, of which sixteen and a half millions of acres are under crop annually. It would be easy for a farmer, by an intelligent improvement of his methods, to increase the annual yield and value of products by at least three dollars per acre. That would mean in figures an increase of the available wealth of the country to the extent of fifty millions of dollars per year. If the poor farmer of the country—that is the man who farms in a poor way—would improve his practices until they were equal to that of the good farmers of the Dominion, the value of the crops and products could be increased annually by at least fifty millions of dollars, without the outlay of a single dollar additional. An acquaintance with the vast extent and almost limitless resources of our country will give spirit to every wholesome national enterprise, and will also put such patriotic pride into the heart of every citizen that he will do better for himself and thus do better for his country.

(Prof. Robertson here, by the use of a map, took his audience on an imaginary trip over the continent commencing at Ottawa, passing through the northern portion of the Province of Quebec, through New Brunswick and into Nova Scotia, through its fertile valleys over to Cape Breton and back to Prince Edward Island, which he characterized as the gem among the provinces of the Dominion, with less waste land in its area than any other. Reference was also made to the large fertile areas of Manitoba and the North-West Territories and to the fields on the river banks in British Columbia which yield enormous crops per acre).

Perhaps no five millions of people on the face of the globe, in a national capacity, are possessed of natural resources and sources of wealth in an equal degree with the people of Canada. The quality of what wealth is, is seldom very well understood by even men who frame the opinions of our agricultural classes. The annual statements of bank managers seem to others, like myself, to be compilations of figures and statements that frequently obscure the true meaning of wealth, its production and distribution.

It would not be wise to weary you or to trouble you with the abstruse definitions which have been given of wealth by many writers on political economy. The ordinary labouring man, as well as the millionaire, knows the true meaning and nature of wealth as something substantial which he wants to gain possession of; and hence I put it that anything that ministers to the wants of man, and the ownership and possession of which can be transferred from one person to another, is wealth. Its main sources are the soil, the air, the sun, the water, the rocks and intelligent labour. From the first four and the last we obtain all agricultural products. They then represent in themselves something which people want to possess, and which have been obtained by intelligent labour. The market never makes or creates any wealth. The frequent handling of a box of cheese or a tub of butter does not add anything to its nourishing qualities. Although a bushel of wheat may change hands every week, such exchange will not add an iota to its life-sustaining qualities. What the country needs is improved methods in the production of wealth, rather than increased facilities for the handling and exchange of wealth.

One factor in the production of wealth, which is most under our control, is that of intelligent labour. The intelligent labour on the farms of England has brought to that country vast wealth, which could never have been secured by the shiftless methods of farming which prevail in this country, and on this side of the ocean. For the best horses we go to England or France. For the best cattle, sheep and swine, for the best live stock for all farming purposes, we go to England. The cause for this does not reside in her superior soil or better climate, but in the superior intelligence of her farming. The operations in these matters have been directed by the

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skill of the educated classes, who have made plans for the work of her farmers. The men trained in the sciences, with intellects brightened by the best education afforded by colleges and universities, have owned the larger share of her farming lands. The rules in the old leases which guided the operations of the farmers, provided for improvement in every kind of product which was obtained from her fields. Far be it from me to recommend that the system which prevailed in England should be transferred to this country. Farmers in Canada live under happier auspices, where every man has the opportunity and need for directing the toil of his own hands by the thinking of his own head. In our country, more than elsewhere, the quality of the working farmer's thought determines the outcome of his own labour. Hence the commercial and professional men of this country, who have unusual opportunities for having their minds sharpened to perceive the best methods of carrying on work, should give the farmers every encouragement and aid towards clear thinking about their own business. The nature of the farmer's work compels him to be a rather isolated individual; he has not frequent occasion to meet his fellows and rub against them in transactions, whereby his mind would be quickened in its action and strengthened in its judgment. There should be nothing of antagonism in the interests of the city and the interests of the country; the prosperity of the one is dependent upon the prosperity of the other. Hence, as the professional and other city men help the farmer to appreciate and acquire knowledge about his business, they advance their own interests.

It has been mentioned to-night that there is a great deal of capital in Montreal seeking investment in all sorts of enterprises. The capital which is most wanted in our country is that of confidence in our own business, a hope in the future of our country, and enthusiasm in carrying on our work. If this association and the city of Montreal can infuse some of that capital into the districts that surround it and into the homes of the farmers, it will render them the largest public service. Somebody's clear thinking must precede and underlie every rational effort that makes for the improvement of products, the increase of profit and the mitigation of toil. Many nostrums for the bringing about of national prosperity have been advertised, sometimes by men from unselfish motives and sometimes by men in prominent positions from motives which had best be left undefined. The one rule for national prosperity, which applies alike effectively to the country and city, is the application of industry with skill, the practice of frugality, fair dealing between man and man, and the blessing of Providence in giving good harvests. National lasting properity, and these conditions, can be brought about largely through the instrumentality of such associations as this and its work.

The present status of agriculture is rather a reproach to the honour of the nation, and threatens its stability. The Governments of the country have recognized the need of helping the agricultural interest because of its bearing towards commercial prosperity; hence the establishment of experimental farms and the work of travelling instructors in dairying and other branches of farming. Their object is to shed the kindly light of knowledge into the homes of the humblest farmers in the whole land as well as into the lives of their more favoured brothers. Their range of usefulness is being yearly enlarged, and the educational part of their work is becoming more effective.

The Dominion experimental farms are under the capable directorship of Professor William Saunders, who is assisted by a staff of able specialists. The reports of the experimental farms are sent free to all farmers who apply for them.

Reference may be made to one or two branches of the work, which seem to exercise the most direct influence in the improvement of agriculture.

Distribution is made of new and promising varieties of grain to the extent of a sample 3 pound bag to every applicant. From the 3-pound bag many farmers obtain a yield of two bushels. By this means they can get into a new and good variety of seed grain very speedily. Over twelve thousand of such sample bags were sent free by mail during the course of last year. The farmers who grow these small plots of grain become more observant in their methods of farming; and

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the educational value to themselves in this regard is quite as important as the possession of a quantity of some new variety of seed. Experiments are carried on in regard to the cultivation of grain under different methods. As one instance of the possibility of improving the yield of grain per acre by the improved methods of agriculture, it may be mentioned that in a series of six ranges of plots on the Experimental Farm at Ottawa, experiments have been carried on to discover the relative results per acre, obtained by sowing the same variety of grain in the same soil during the same season at different dates. Two plots of wheat, barley and oats are sown as early in the season as the land can be worked; a week later the same varieties are sown upon adjoining plots, and so until the 36 plots are sown by the end of the 6th week. The early sowing seems to result in a much larger yield, which is very striking in the case of wheat and barley.

In the following table the results are presented in a form convenient for comparison:

| — | Sown, April 21. — Yield, per Acre. | Sown, April 28. — Yield, per Acre. | Sown, May 5. — Yield, per Acre. | Sown, May 12. — Yield, per Acre. | Sown, May 19. — Yield, per Acre. | Sown, May 26. — Yield, per Acre. |
|---|---|---|---|---|---|---|
| *Spring Wheat.* | Bush. lb. | Bush. lb. | Bush. lb. | Bush. lb. | Bush. lb. | Bush. lb. |
| Campbell's White Chaff .. | 47 50 | 32 50 | 27 30 | 29 30 | 28 30 | 19 10 |
| White Connell ..... | 35 50 | 26 40 | 30 00 | 23 20 | 23 40 | 27 10 |
| *Oats.* | | | | | | |
| Prize Cluster..... | 59 24 | 84 04 | 54 24 | 33 08 | 53 03 | 40 00 |
| Banner... ... ... ..... | 76 01 | 79 24 | 86 26 | 87 22 | 78 18 | 55 30 |
| *Barley.* | | | | | | |
| Prize Prolific..... | 65 10 | 55 35 | 50 20 | 51 37 | 40 40 | 37 14 |
| Baxter's Six-rowed..... | 55 35 | 67 04 | 56 32 | 42 39 | 34 08 | 35 30 |

The experimental work in the feeding of cattle has also a very important bearing upon the improvement of agriculture and the prosperity of the country. As was mentioned at the morning session of this convention, it has been successfully demonstrated that steers can be fattened on a ration of corn ensilage and meal at 7 cents per day less for feed, with an average gain of more weight during the the same feeding period than upon a ration of hay, roots and meal. Experiments are also in progress at our Experimental Dairy Stations to direct the attention of the farmers to the possibility of developing the winter dairy business, whereby they will be enabled to export to England quantities of butter, which will bring as large an income to the country in the winter as we now realize from our shipments of cheese during the summer. The handling of cheese through Montreal in the course of last year aggregated something like 4,000 car loads. The shipments of butter during the winter in the course of ten years should reach an equal value. This could be brought about by the extension of feeding ensilage and the growth of larger areas of corn.

The developments of civilization have changed the conditions of the farmers very much; they have made competitors out of men who are geographically far removed from each other, and in this competition the farmers who produce the most concentrated products will usually succeed best.

Now-a-days the butter-maker in New Zealand is a direct competitor with the butter-producer in Ontario. They both send their products to England, for the Eng-



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lish market. The freight charges on a tub of butter weighing sixty pounds need not be very much higher than the freight charges on an equal weight of grain. A tub of butter may readily bring $12 or $15, while a bushel of grain might bring $1.

Under the auspices of the Dominion Government, two cheese factories in Ontario have been altered into creameries for winter butter-making. The first shipment of winter-made creamery butter was sent to the English market a few weeks ago. Advices have since been received that it has met with the most favourable reception and is rated as being almost as fine as the finest Danish butter.

When our farmers have a number of fresh calved cows for winter dairying the butter will be altogether as fine as that which is sent to England from Denmark or any other country. The only difficulty in the lot which was sent was due to the absence of a rich flavour, owing to the cows whose milk was furnished to the factory being calved for a long time. I fully expect that at least twenty-five such creameries will be in operation in Ontario during the winter of 1892-93.

If even a million of dollars from the exportation of butter could be obtained annually within three years, that would prove a boon to the country in many respects. This industry does not displace any other, and does not lessen the farmer's receipts from any other source. On the other hand, it enables him to develop other branches of his business with more advantage and profit. In some measure the farmers, as well as men in other callings, have lost control of the market; but inasmuch as they have gained control of the cost of production by improved methods and increased knowledge, their profits may still be as large as ever. Profit always comes in between the cost of production and the price that may be realized. If the former can be reduced, the profit is more certain to stay with the farmer than if the latter happens to be increased by any combination of circumstances. The profits from an advance in price usually stay in the pockets or tills of the crafty commercial men; the profits that are obtained from the reduction in the cost of production are more generally left in the possession of the farmers.

In the development of agriculture, farmers should be discouraged from marketing primitive products, which take from the soil large stores of its fertility. They should be encouraged and advised to sell animals and their products, which enable them to realize larger incomes without the exhaustion of the soil. Farmers have an impression that there are much larger profits in manufacturing than in agriculture. I think the farmer is right in this impression; but instead of advising him to complain because this state of things exists, I would advise him to become a manufacturer himself, and thus obtain his share of these larger profits. The primitive products, such as hay, corn stalks, pease, barley and oats, can be manufactured into refined and concentrated products, such as beef, butter, cheese, pork, mutton and horses. Of all agricultural products, leaving out horses and hay, Canada exported to Great Britain and the United States last year to the value of $35,955,986. While this export trade is of great value to the farmer, he should never overlook the value to him of the home market, and he should cater to meet its requirements. Of these products which I have mentioned, Canada exported to the United States during last year to the value of $10,017,390. During the last ten years the increase in the city and town population in Canada amounted to 384,146. That number of persons living in towns, and not producing food, consume of farm products annually, at the wholesale farmers' prices, to the value of at least twenty-one millions of dollars. An enlarged home market can be created and sustained by furnishing products of the very best quality.

(The remainder of the address was devoted to a discussion of the development of the cheese, butter, cattle, sheep, swine and grain interests of Canada; as the substance was similar to that presented at pages 92 to 99 of this report, it is omitted here.)

Better methods and better systems of farming would enable the farmers to produce larger quantities and superior qualities of all these commodities which I have enumerated. The material wealth of the most important and numerous class of our

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citizens would be augmented; and better gains and benefits than that would come to our country from a betterment of the financial condition of its rural population.

The fruit of better farming would be observed in an improvement of the country homes, in their furniture and equipment, in the clothing of the farmers and their families, in their carriages and harness, and in the possession of all those manufactured articles the making of which gives employment to the denizens of our cities.

The possession of these things would be the cause and consequence of an improvement in the intellectual life and activities of the farmers and their families. For many of its strongest and best intellects the nation, in its most comprehensive sense, has to draw from the country homes. The man who attains eminence in professional life, and in commerce and manufacturing, is frequently recruited from the ranks of the farmers' boys. The vigour of intellectual life usually accompanies a sense of contentment and satisfaction among farmers who are doing well. In this regard, again, improvement in agriculture would re-act most beneficially on the intellectual life of the whole Dominion. To the farmers' judgment as the final court of appeal is submitted all public questions; and upon its verdict depends the policy of the people in their national capacity.

The moral life of the people in some measure depends upon their personal comfort and well-being. In this regard, also, improvement in agriculture, with increased prosperity in commercial circles, would tend to give our people a kindlier and more brother-like feeling towards their fellow-citizens.

As has been already indicated, we are essentially an agricultural people, and our commercial enterprises depend in a large measure on the success which attends the farmers' efforts.

The production of greater wealth on the farms of the country would give every honest business man a better chance to obtain a share of it for the support of his family and for the accumulation of a competence under favourable conditions. I am hopeful that with the assistance of all classes in the community, and under the direct leadership of the leading commercial men of cities, very speedily the farmers of Canada will come to be recognized as the people who have the most comfortable homes, the most contented lives, and the most advantageous opportunities for acquiring all that the heart of man can honestly desire, of any people who follow farming on the surface of our mother earth.

### (5.) THE BABCOCK MILK TESTER FOR THE CHEESE FACTORY.

*(Report of an Address before the Convention of the Dairymen's Association of Eastern Ontario, at Cobourg.)*

Prof. Robertson, Dairy Commissioner for the Dominion, was then invited to continue the discussion of the testing of milk, and the payment of milk at cheese factories according to its quality. He said: "The effect of paying a man who sends milk to a cheese factory, solely for the number of pounds of milk which comes in his can, has been to create a feeling of suspicion in the minds of farmers regarding the honesty of their neighbours and the fairness of the management of the factory. You can never make a foundation for a business so deep that the superstructure will not be threatened with disaster when such a feeling is allowed to prevail. It will never do to pay A for more than comes in his can, nor B for less than comes in his. If you can devise some method which will make a fair division, you will eliminate suspicion. We have never found it needful to argue with farmers as to the advantage of accepting and doing the right thing, if we could only show them *how* to do it and how it should be done. As soon as you can show the farmer how to pay for milk according to its value at cheese factories and creameries, he will go with you. In making butter, it is very easy to frame an accurate basis for distributing the proceeds. The quantity of butter-fat bears a somewhat constant relation to the quantity of butter which can be made from the milk. If you add to the



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butter-fat about one-sixth of something else, which sells at the same price as the butter-fat (although intrinsically not really worth as much), what is the result? In every six parts, five will be butter-fat and one something inferior. Yet all these parts are selling at the price of the butter-fat. That sixth or added part is largely water, yet owing to its associations with excellent butter-fat it will bring an equal price with the butter-fat. You have in cheese three main constituents coming from milk—fat, casein and water. Now a certain part of the water in milk has a value. I can sell some of the water at 10 cents a pound, if I receive that price for my cheese. Water, like other things, gets an acquired and accredited value by the company in which it is found. For instance, I had a cheese-maker once, who was an awfully untidy fellow, and did not make fine cheese regularly. I bore with his infirmities, and he is now a good cheese-maker. The last time I visited his factory it was as clean as his wife's parlour. He got married to a good, smart, tidy woman, and since that time, from being much in her good company, he has been improved in like manner. You will never find a consumer of cheese finding fault with the water in cheese, if it is in good company. If you have too much water for the fat or for the casein, the cheese will go off flavour. But if the water is in its right place and proportion, you will have a well flavoured and a merchantable cheese. The casein alone will not determine the value of the milk for cheese-making; neither will the fat; the water must be there in the proper amount. It is only when there is the proper proportion of these three that the fat is a sufficient standard for valuation. We must be fair. I have seven or eight assistants, and there is not a man of them who would not work his finger nails off for the good of the department. My friend Mr. Ruddick did a lot of good work at the experimental factory in Perth. Let me give you a few points in regard to his work there. Extending over a considerable period, we had cheese made from milk containing an average of 3·86 per cent of fat. There was one large vat with two partitions put in, making three compartments. The milk from all the patrons was tested and put into three classes—rich, medium and poor. We made cheese from these three. The average for the rich milk was 3·86. In the medium compartment was put milk averaging 3·6, and in the third compartment was placed the poor milk, which averaged 3·45. These are the averages for nine days in each case. That is not a wide difference, but it was as wide as we could get and fill the compartments. The process of manufacture was uniform in each case. The richest milk in the last half of July and the first week in August required on an average 10·38 lb. of milk to the pound of cheese. (The average of the Province of Ontario for that season of the year was over 11 lb. with cheese made in the same way.) The average of the middle compartment was 10·84 lb. of milk to a pound of cheese, and the average of the third lot was 11·21 lb. In milk containing between three and four per cent of fat the gain in the percentage of fat becomes more important, as in this case every two-tenths of a per cent of fat would give about three-tenths of a pound of cheese additional per 100 lb. of milk. The average yield of cured cheese per 100 lb. of milk is indicated in the following table:—

| | | | |
|---|---|---|---|
| Average per cent. of fat in milk, | 3.86 | 3.60 | 3.45. |
| Yield of cheese per 100 lb. of milk. | 9.63 lb. | 9.22 lb. | 8.92 lb. |

It appears that the richer the milk is in fat, up to four per cent, the larger is the quantity of water which can be retained with the other constituents of cheese without deterioration to its quality. In ordinary cheese-making, where you have milk containing four per cent of fat, you have reached the maximum limit, and beyond that you cannot increase the per cent of water that will be retained in the cheese with advantage, and you do not increase the value of the cheese per pound.

Near London I had Mr. Dillon carrying on a series of tests, and I say without hesitation that in looking over the whole Dominion of Canada I do not know Mr. Dillon's superior as a cheese-maker. Like other good men, he has a few equals. We got a wider range of quality in the milk as to richness at this factory. From

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one compartment we skimmed a little on a few occasions in order to get the difference wider. We had three averages of 2·91, 3·46 and 4·13 per cent of butter-fat in the milk respectively. Each average represents from nine to twelve tests. For the richest milk in this case, the number of pounds of milk required to yield a pound of cured cheese was 10·01; the average required for the medium milk was 10·67 lb., and the average for the third or compartment of poorest milk was 11·71 lb. All the cheese were made by the same man, in the same factory and according to the same system. The cheese-maker can take milk containing a low percentage of fat and make from it a large quantity of cheese, if he be a capable and clever maker. He may even in a large measure replace fat by skill, and make money from poor milk by putting skill into it. But no maker can do that successfully and honestly, with our present market conditions, when milk goes below three per cent of fat. You obtain a large additional weight of cheese from richer milk, and thus a man who furnishes to a factory milk containing a large percentage of butter-fat is entitled to a greater share of the cheese, since more weight of cheese comes from his milk than comes from the milk of other men whose cows give poor milk. If two farms of different values are together it would not do to pool the money from the sale of them, and divide the amount evenly between the two sellers. One farmer would lose and the other would gain by the transaction. We have stored some of these cheese in the curing room at Ottawa, and will keep them until next summer. I have also sent some of each of the three kinds to the old country, and I am waiting to see if the English dealers will endorse my scale of valuation, as to the relative values of milk containing different percentages of fat. I think that the addition of each per cent of fat to the milk between 3 and 4 per cent will add $\frac{5}{8}$ of a cent per lb. to the value of the cheese. The butter-fat in some measure adds to the value of the other constituents of milk. Let me put it in the following manner:—A farmer sends milk containing 3 per cent of butter-fat to a cheese factory and gets so much money. Another farmer sends milk containing 4 per cent of fat to the same factory. According to a scale which values milk for cheese-making according to its percentage of fat only, the latter will get one-third more money per 100 lb. of milk than the patron who furnished the 3 per cent. milk. I do not say that his milk will make one-third more cheese, but in my opinion it will have one-third more value in cheese-making when both the quantity of the cheese and its quality are considered.

In ordinary work a few things have to be guarded against in using the Babcock tester. I have come across a pipette furnished with a Babcock instrument which contained more or less than the required 17·6 c. centimetres of milk. You cannot depend upon the absolute accuracy of the pipette, unless it be warranted by a competent and reliable authority. If you test milk at a creamery, a patron should be paid for about one-tenth more butter than the weight of the actual butter-fat. In the working of the Babcock machine there will be sometimes a loss of speed in the whirler by the slipping of the belt. The bottles require whirling to the extent of at least 5,000 revolutions in order to get a proper reading of the fat.

Mr. D. M. Macpherson.—Has the speed any effect?

Prof. Robertson.—I do not think that mere speed, without enough time, would give sufficient separation. There has been a good deal of difficulty in getting rid of the flocculent spots of curd. The use of the correct quantity of sulphuric acid of 1·82 sp. gr., and a thorough shaking of the contents of the bottle before they are put in the whirler, will prevent that trouble. The difficulty has occurred oftenest in making tests with composite samples of milk which have become sour. Dr. Babcock says: "It may be entirely avoided by filling the bottle with a hot mixture of equal parts of sulphuric acid and water, instead of water alone." It is not easy to read accurately if the bottles be allowed to cool. The water should be added as hot as practicable. In connection with some prosecutions for tampering with milk by patrons of factories, I have been written to by lawyers, patrons and makers. And I have to say that I believe there have been some prosecutions of honest men. I would rather that fifty guilty men should go unpunished than wound an innocent

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man who was honest. (Applause.) It is not fair to say: "We will settle with you for $25, or we'll prosecute you." Some men will say: "I am innocent and will fight you;" but others again will say, "I am innocent, but there is my wife and family, and if I do not settle, although I am innocent, the charge will get out and it may stain or ruin my reputation." Pay for a man's milk according to its value, and eliminate all these unpleasant bickerings and prosecutions. If a man sends you good milk, pay him for it; and if he sends you poor milk, pay him for it according to its quality. Put that proposition before the farmers, and nine-tenths of your patrons will adopt it. Otherwise you put a temptation before men to send poor milk, for if a man can get the same price for milk of poor quality that another milk of richer character fetches, there is no inducement for him to improve the quality of that inferior milk. By the use of the Babcock tester it is easy to calculate the total quantity of fat in any patron's milk. Then the total quantity of butter-fat in all the milk furnished during the period for which a distribution is to be made can be ascertained. The total quantity of cheese or butter may be taken; but that is not an essential factor in the final calculation. The total quantity of butter-fat represents for all purposes of distribution the total quantity of milk. Then by dividing the total amount of money to be distributed by the number of pounds of butter-fat, the value of each pound of butter-fat will be ascertained. Each patron will be entitled to the amount of money which is represented by multiplying the total number of pounds of butter-fat in the milk furnished by him by the value of the butter-fat per pound. That will provide for a simple and fair distribution of the proceeds. The milk should be tested at least twice a week. That may be done most thoroughly by putting one-third of the full quantity of 17·5 c.c. of milk into the test bottles every morning, and completing the test every third day. If the dairymen keep on paying for poor milk—even if it be pure—at the price of rich milk, and then continue to pay for rich milk—also pure—at the price of poor milk, and persist in the indiscriminate pooling of rich and poor at the same price, then the poor milk will ye have with you always.

### (6.) MILK TESTING FOR CREAMERIES.

Prof. ROBERTSON was next introduced. He said: Mr. President and Gentlemen, I am very glad to come again to Brockville to speak to the Ontario Creameries' Association.

There has been a good deal of trouble over the whole province during recent years by reason of suspicions that have arisen concerning the honesty of dairymen who are patrons of co-operative factories. A very large number of prosecutions have been instituted because some men were suspected of taking something out of or putting something into the milk. As I came on the train this afternoon, I sat for a long distance in a compartment where two inspectors for insurance companies were discussing their business. One said that at a point not more than a hundred miles from here, he had visited a risk that they carried, and the local agent said to him, "When you go back to the head office write and cancel the policy on that farm property; the occupant can hardly be trusted." In a short time the local agent wrote back, "You can cancel that cancellation and leave the policy in force, as the suspected person has moved away." You see! The risk of damage to the farm property was not so much from accident, as from the moral or immoral quality of the man who occupied the premises. Now, this moral quality of the man in co-operative dairying is an element you have to meet and provide for; and you can never fully meet that by any system of inspection, prosecution or fine. But if you can get down to a basis by which you will pay a patron of a factory precisely for what the milk is worth, you will eliminate the whole of the immoral desire that tends to adulterate the milk. A man will not keep so much cream for the coffee, or will not think it worth while to add water to his milk cans, if he be paid for their actual

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contents—milk, skimmed-milk or water, as the case may be. By this means you will prevent the man from being tempted to yield to doing a thing that is wrong, for the sake of the money he can make by it.

Let me give you an illustration. I go occasionally to the live stock markets. I see a steer that weighs 1,000 pounds brought there by one farmer—a steer of poor breeding and worse feeding—a steer of inferior quality, worth 3 cents a pound. I find another farmer with his beast better bred and fed and housed, weighing the same—1,000 pounds—worth 5 cents a pound. One is worth $30 and the other $50, and there are 1,000 pounds weight in each. Do you suppose you would find the farmer owning the better animal prepared to say to the other, "We will divide the sum total of the value of the two and take $40 each?" I tell you nay; and you will find the seller who got only $30 wondering why the other got $20 more than he, until he has a better beast next time.

Now, in all our co-operative factories for cheese-making and butter-making we can never hope to have durable satisfaction unless we have fair play. Every body wants that, and every body says he is going to get and give that. If you can merely show the farmers how to establish a basis of fair play, you will not find a single man who will offer any opposition publicly. I never knew a man mean enough to say he would not give his neighbour fair play. Sometimes sayings and doings do not quite agree.

Then we have had some suspicion aroused because the farmers have known they were not getting fair play, and a few men have become dissatisfied, until the element of distrust has done more to hinder the progress of creameries and cheese factories than anything else. As soon as people get suspicious of one another they lose all enthusiasm in and for their work. The practice of paying for the milk at the creameries by the pound, regardless of quality, does harm to both classes of patrons—harm to the one who sends rich milk, because he does not get what his milk is worth, and more harm to the other man who sends the poor milk, because he gets something for nothing. As soon as you find a man getting that, he is deprived of the incentive to provide and do something better. If you furnish the man with that incentive, he goes along producing the purest and best quality at the highest profit to himself.

Then I think you may take it for granted that the farmers of the whole Dominion are quite willing to adopt a basis for the payment of milk which shall be fair, if they are taught how to do it. All through my experience with farmers I have observed this: I have found a readiness to do what they believe to be right when they see how it can be done. There is more often a difficulty to see the right way, than a want of willingness to walk in it.

Now for butter-making there can be no difficulty in paying for milk according to its real value, if you can discover precisely the percentage of butter-fat which it contains. Butter is not all butter-fat, but five-sixths of all good butter is butter-fat. Then one-sixth more is added from other constituents of the milk. We may include the salt in this one-sixth. If 5 lb. out of every 6 lb. are butter-fat, it follows that the more butter-fat the farmer furnishes the more butter his milk will make, and the quantity it will make will vary according to the butter-fat in his milk. Now, this other one-sixth portion of butter is largely water. In some of the butter which I have just been examining at your exhibition here there has been more than a sixth of its weight of water, and that is one of the chief faults the butter in the adjoining-room is characterized by, in the opinion of Mr. McKergow and myself. That defect is caused by creamery-men washing the butter in the churn during winter weather, with water as cold as they would use during July. The temperature of the water in winter should not be below fifty-eight degrees. If you try to get at the value of the milk for butter-making by any other constituent than the butter-fat you will fail.

Let me give you a few figures I copied the day before yesterday in a large creamery I had the advantage of inspecting. I suppose many of you have heard of

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the St. Alban's creamery, Vermont. They make some five tons of butter a day in the summer time. They have about 700 patrons. Now, here are the reported values of the milk at that creamery for June, July, August, September and October. I give you the lowest and highest each month, showing the variation in the butter value of milk per 100 lb.

| | Lowest. | Highest. |
|---|---|---|
| June | 56 cents. | 81 cents. |
| July | 55 " | 86 " |
| August | 62 " | 95 " |
| September | 77 " | 131 " |
| October | 92 " | 153 " |

You will see that during October the milk from one man was worth 61 cents per hundred pounds more than the milk from some other man. The farmer, as soon as he finds he is paid for his milk according to its true quality, will keep better cows, more cows, and give them better care. I need not reason any more to show that this is the only fair basis upon which to carry on the co-operative creamery business. Now, the Babcock milk tester, invented by Dr. S. M. Babcock, of Wisconsin, provides a very simple, accurate and reliable method for estimating the butter-fat in milk. Every dairyman in the land is indebted to Dr. Babcock for the magnificent help which he has rendered to the dairy interests of the world. With rare unselfish public spirit, he has given his invention free to the community. I know of no better or greater boon in the way of a testing apparatus for dairymen than the Babcock milk tester. They owe it to the ability, patient research and generosity of this distinguished chemist.

For ordinary practice in the dairy I may point out to you a few things that have come to my knowledge as to the way of handling milk in testing by the easiest methods and to save labour. A test made once a week will not give a quite accurate indication of the average quality of that milk for the week. The milk will fluctuate in quality from day to day. It will not vary much from day to day in a herd, but a great deal in the individual cow. The only way is to have samples taken oftener than once a week. One of the best ways I have learned so far was described by ex-Governor Hoard at Cobourg. A sample is taken from each patron's milk every day to the quantity of one-third of the 17·5 c.c. required for a test. Then the full test is completed twice a week or every third day. It saves labour, and in that way you get a true test of the quality of the milk every day. I therefore recommend the method which they are pursuing in Wisconsin for economy, efficiency and reliability. Then, in the handling of these samples, the butter-maker can never be too careful to make sure that the pipette with which he measures the sample of milk is of the exact capacity. We have found some of the measuring pipettes not true as to the size. If there were two in the factory, and the maker used one for one man's milk and the other for another, and they were not precisely alike, there would be a material difference in the result. They need to be of the same capacity exactly.

In the Babcock testers used in Ontario, I find some machines which are defective in regard to mechanical construction. Some are driven by a loose leather belt, which occasionally slips, and then the whirler is not driven so fast; and the speed being lessened the separation of the fat will not be complete. So there is need for having such a machine as will enable you to be quite sure that the required number of revolutions have been given. I have no hesitation in saying that, in my opinion, a machine driven by cog wheels or similar gearing is better than one driven by the kind of friction that I have referred to.

For convenience in adding the sulphuric acid to the test bottles we have used a rack, which may be circular or straight, for holding them after the samples of milk have been put in them. The acid is contained on a burette which is graduated to quantities of 17·5 c.c. By passing each bottle under the glass stop-cock of the

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burette the correct quantity of acid can be added easily and speedily. The rack holding the bottles is then shaken with an oscillating and rotary motion, whereby the acid is mixed with the milk in all of the test bottles at the same time. (See figures on page 122.)

In the handling of the samples it is always advantageous to keep the bottles as hot as possible during the whirling, and until the percentage of fat is read in the neck of the bottle. Any cooling will interfere with the uniformity of the test. I have come across a man who thought he was quite right in measuring the quantity of fat in the neck of a bottle by a wooden scale which he had constructed. He had used a pair of calipers to measure the fat, and then put them on the scale and read the percentage of fat by its figures. The necks of some of the bottles are narrower than others, so you can never be too careful to read the percentage of fat on the scale marked on the neck of the identical bottle in which the sample was tested.

I shall make this further observation, that as soon as this method of payment is adopted you will find a great improvement in the quality of the milk and a perceptible increase in the quantity of fat in the milk, which comes from good housing, good feeding, good care and good breeding. As soon as a man finds that he is paid for his milk according to its quality he will take more care to produce milk of the best quality; and that will stimulate him to produce more butter-fat of a superior quality. There are very few neighbourhoods that will not respond to the pride of reputation, which comes from getting paid the highest price that is paid any other neighbourhood for what they have to sell. I have not made that quite clear. I do not think that the people around Brockville would furnish quite so much milk to the cheese factories if it were not that the Brockville cheese factories have an excellent reputation, and the patrons of the factories feel proud of their good name and success. Now, if you can help the farmers to get the highest possible price per hundred pounds for their milk in a certain neighbourhood, then every man will have more pride in his business; and if one feeder will make more milk of a better quality than his neighbours, they will make a point of finding out how it is done. On the other hand, if any neighbourhood supplies poor milk, which is pooled with rich milk and paid for at the same price, you will find that milk of poor quality from scrub cows will continue to prevail. Wherever buyers of cattle give the same price for all animals, there you will find the poorest animals, because the farmers have no incentive to keep better ones. Make a distinction and discrimination in the quality and a difference in the price, and then the whole business will respond. Thus an enhanced price will be secured for the whole output. There are few people whose moral stamina is so robust that they can refrain from leaning towards the wrong when it pays to do wrong. If a man finds it pays to do wrong he may not fall clean over that way, but he will lean that way. If you make it pay in cash to do right, you will help the man to lean that way.

### FURTHER PARTICULARS ON THE BABCOCK MILK TESTER.

Since these addresses were delivered, we have carried on a series of tests at the experimental dairy at the Central Experimental Farm, (1) to compare the results which were obtained by testing samples immediately after they were measured into the test bottles, with the results from samples of the same milk which were left standing in the test bottles three and six days, respectively; (2) to compare the results from composite tests of milk with the mathematical average obtained from completing the tests every day of the several milks of which the composite samples were made up.

The following cuts illustrate two styles of wooden racks which have been made for holding the test bottles. They also provide for a convenient and rapid method of adding the acid to the samples. The rack shown in Figure 1 can be revolved on the upright spindle which rises from its foot.

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FIG. 1.

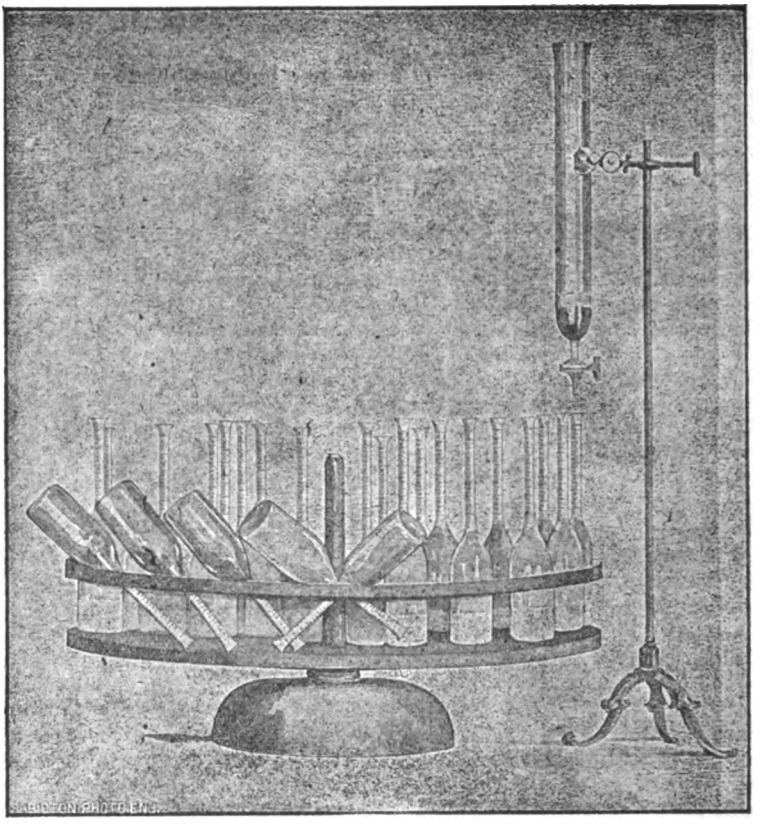
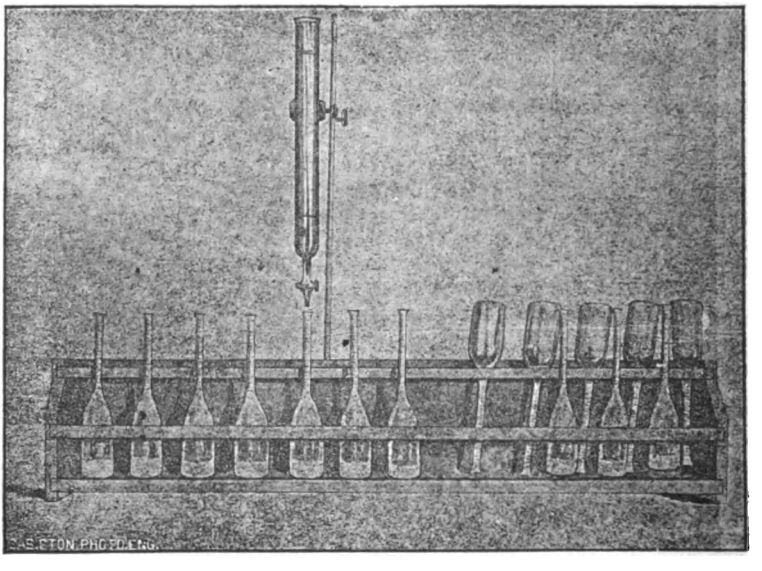


FIG. 2.



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*First Series.*—Six samples of herd milk were measured with the 17·6 c.c. pipette into six test bottles. Two of the samples were completely tested at once; two of the samples were left for three days and then tested; the remaining two samples were left for six days and then tested. The test bottles stood in a rack in the working room of the dairy at a temperature of from 55 deg. to 65 deg. The milk at three days was sour but not coagulated; the milk at six days was sour and thickened. Three trials in duplicate were made, with the results which are shown in the following table:—

TABLE I.

| — | Tested Immediately, p. c. of fat. | Tested after 3 days, p. c. of fat. | Tested after 6 days, p. c. of fat. |
|---|---|---|---|
| First trial | 4·1 | 3·9 | 3·9 |
| | 4·1 | 3·9 | 3·9 |
| Second trial | 3·5 | 3·5 | 3·5 |
| | 3·5 | 3·5 | 3·5 |
| Third trial | 3·2 | 3·2 | 3·2 |
| | 3·2 | 3·2 | 3·1 |

*Second Series.*—In this series, tests of herd milk were made in duplicate on each of two days; the mathematical averages from these four single tests are put in column 1 of Table II, for comparison with the results from composite samples obtained by taking a sample by an 8·8 c.c. pipette from the milk on each of the two days, and putting them in one test bottle. These composite samples were taken in duplicate, and the average results from them are put in column 2. Five trials in duplicate were made.

TABLE II.

| — | COLUMN 1. Average of tests on 2 days. | COLUMN 2. Average of composite sample tests. |
|---|---|---|
| First trial | 3·95 | 3·9 |
| Second trial | 3·40 | 3·3 |
| Third trial | 3·65 | 3·6 |
| Fourth trial | 3·50 | 3·6 |
| Fifth trial | 3·75 | 3·8 |
| Average of five trials | 3·65 | 3·64 |

*Third Series.*—In this series, tests of herd milk were made in duplicate on each of three days; the mathematical averages from these six single tests are put in column 1 of Table III, for comparison with the results from composite samples obtained by taking a sample by a 5·9 c. c. pipette from the milk on each of the three days and putting them in one test bottle. These composite samples were taken in duplicate and the average results from them are put in column 2. Five trials in duplicate were made.

TABLE III.

| — | COLUMN 1. Average of tests on 3 days. | COLUMN 2. Average of composite sample tests. |
|---|---|---|
| First trial | 3·66 | 3·60 |
| Second trial | 3·48 | 3·50 |
| Third trial | 3·73 | 3·50 |
| Fourth trial | 3·50 | 3·50 |
| Fifth trial | 3·97 | 4·17 |
| Average of five trials | 3·67 | 3·66 |

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*Fourth Series.*—In this series, tests of herd milk were made in duplicate on each of six days; the mathematical averages from these twelve single tests are put in column 1 of Table IV, for comparison with the results from composite samples obtained by taking a sample by a 2·9 c. c. pipette from the milk of each of the six days and putting them in one bottle. These composite samples were taken in duplicate; they were all sour and thick before being tested; and the average results from them are put in column 2. Five trials in duplicate were made.

TABLE IV.

| — | COLUMN 1. Average of tests on 6 days. | COLUMN 2. Average of composite sample tests. |
|---|---|---|
| First trial | 3·13 | 3·10 |
| Second trial | 3·75 | 3·60 |
| Third trial | 4·12 | 4·00 |
| Fourth trial | 3·57 | 3·50 |
| Fifth trial | 3·51 | 3·60 |
| Average of five trials | 3·61 | 3·56 |

In some of the composite tests it was difficult to obtain clear readings, on account of the fat being charred and containing flocculent spots of curdy matter. By using a smaller quantity of sulphuric acid at the beginning of the tests and "filling the bottles with a hot mixture of equal parts of sulphuric acid and water, instead of water alone, the trouble may be entirely avoided."

*Fifth Series.*—Samples of herd milk were taken daily and tests were completed in duplicate. The results are shown in column 1. Samples of the same milk were put in a glass-stoppered bottle in equal quantities on each of three days. These composite samples were tested in the usual manner by measuring the contents of the 17·6 c. c. pipette into test bottles in duplicate. They were quite sour but not thick. The results are shown in column 2. Five trials in duplicate were made.

TABLE V.

| — | COLUMN 1. Average of Tests on 3 Days. | COLUMN 2. Average of Composite Tests. |
|---|---|---|
| First trial | 3·66 | 3·60 |
| Second trial | 3·80 | 3·70 |
| Third trial | 4·10 | 4·00 |
| Fourth trial | 3·77 | 3·80 |
| Fifth trial | 3·50 | 3·40 |
| Average of five trials | 3·76 | 3·70 |

From these trials it would appear that results which are practically accurate may be obtained by putting the contents of a 2·9 c. c. pipette into one of the test bottles every day for six days when the test may be completed. If the milk from any patron should vary very greatly from day to day in both quantity and quality, a slight error might be introduced. But in ordinary cheese factory and creamery work the six-day composite test seems to give accurate results with the least labour and expense.

## PART VII.—CONDENSED MILK.

At the request of the Hon. the Minister of Finance an examination was made of the quality of three samples of condensed milk which were furnished. The chemical analyses were conducted by Mr. Frank T. Shutt, Chemist, Central Experimental Farm. His report is as follows:—

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CONDENSED MILKS.

"The brands analysed were 'Reindeer Brand,' manufactured by the Condensed Milk and Canning Company, Truro, N.S., the 'Shamrock Brand,' of the Condensed Milk Company, of Limerick, Ireland, and the 'Fruit Brand,' of Cleeve Bros., London and Liverpool.

"On opening the tins a preliminary examination of the physical characters of the milk afforded me the following data:—

"'Reindeer Brand,' of a slightly yellowish tint. In an excellent state of preservation and evidently a well-made milk, perfectly homogeneous throughout. Readily soluble in water, yielding a milky fluid, very sweet, with a slightly 'boiled' taste.

"'Shamrock Brand,' of a bluish-white tint. In a good state of preservation, easily soluble in water—the resulting fluid having a marked flavour of boiled milk. One tin of this brand was found on opening to be somewhat fermented, evidently owing to imperfect soldering.

"'The Fruit Brand,' somewhat darker in colour than the milk of the 'Reindeer Brand.' Well made and in a good state of preservation, easily miscible in water, with a sweetish 'boiled' flavour.

The composition of the milks, as elicited by a careful and thorough analysis, is depicted in the subjoined table:

COMPOSITION OF CONDENSED MILKS.

| —— | Reindeer Brand. | Shamrock Brand. | The Fruit Brand. |
|---|---|---|---|
| Water | 25 67 | 30 22 | 27 70 |
| Total solids | 74 33 | 69 78 | 72 30 |
| Fat | 7 29 | 35 | 5 13 |
| Curd (casein and albumen) | 8 44 | 10 44 | 9 31 |
| Milk sugar | 13 49 | 10 60 | 14 30 |
| Cane sugar | 43 16 | 46 06 | 41 50 |
| Ash (mineral matter) | 1 95 | 2 13 | 2 06 |

"The foregoing data were obtained from duplicate estimations of each constituent. It is possible that a part of the cane sugar appears as milk sugar; in the process of manufacture some of the cane sugar may be converted into a form of sugar that by analysis would be determined with the milk sugar.

"The following table may be useful in showing that when condensed milk is diluted until it contains a percentage of solids about equal to the percentage of solids in whole pure milk, it is not a complete or well balanced food. This is owing to the large proportion of cane sugar in the total solids, the sugar being added for the purpose of preservation.

"If to one measure of these milks five measures of water be added, the composition of the resulting fluid will be as follows. The analysis of an average sample of pure milk is here added for the sake of comparison:—

| —— | Reindeer Brand. | Shamrock Brand. | The Fruit Brand. | Pure, average Milk. |
|---|---|---|---|---|
| Water | 87·50 | 88·34 | 87·95 | 87·25 |
| Total solids | 12·50 | 11·66 | 12·05 | 12·75 |
| Fat | 1·21 | 0·06 | 0·85 | 3·50 |
| Curd | 1·41 | 1·74 | 1·55 | 3·90 |
| Milk sugar | 2·25 | 1·80 | 2·38 | 4·60 |
| Cane sugar | 7·20 | 7·63 | 6·92 | ..... |
| Ash | 0·33 | 0·38 | 0·35 | 0·75 |

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"It will be seen that these are all 'sweetened' condensed milks, cane sugar being largely added as a preservative during evaporation. It has been held until quite lately that the addition of cane sugar is necessary for keeping the milk in good condition. By an improved process, however, unsweetened condensed milk is now manufactured in Switzerland. This is said to be of excellent quality. I do not think it is to be found in the Canadian markets.

"In the manufacture of condensed milk, when whole milk is concentrated, unless the greatest care be exercised, oily globules separate, and the flavour becomes more or less rancid. It is, however, apparent, from the condition and analysis of the 'Reindeer' and 'Fruit' brands, that excessive skimming, such as has been practised in the case of the 'Shamrock' milk, is not required in order to preserve a good flavour. The unsweetened condensed milk before alluded to is whole milk, concentrated to one-third of its bulk. It is, however, not free from the 'boiled' flavour, apparently an inevitable result of concentration.

"Although condensed milk is an extremely valuable preparation, it cannot be considered as a perfect substitute for new milk, on account of its poorness in fat, its peculiar flavour and diminished palatability, and its excess of cane sugar.

"Great care and skill are requisite in the concentration of milk, and it should be the object of the manufacturer to avoid, as far as possible, the development of the boiled flavour, retaining, at the same time, the butter-fat of whole milk and avoiding the excessive use of cane sugar.

"Flavour is perhaps of as much importance as any other factor in determining the quality of a condensed milk, and in this respect the 'Reindeer' brand, made at Truro, N.S., takes the first place among those examined. Its condition betokens care in its manufacture, and the tins have been soldered air-tight. In composition it is somewhat richer than the 'Fruit' brand.

"The 'Shamrock' condensed milk is the poorest of the three, both in composition and flavour. It is practically fat-free, and has a marked taste.

"The 'Fruit' brand is a good milk, and in most respects may be considered equal to the 'Reindeer' milk. Its condition, flavour and composition testify to its excellence as a sweetened condensed milk."

Besides the foregoing report of Mr. Shutt, I beg to submit the following observations for your further information:—

1. Two kinds of condensed milk are now manufactured and sold in considerable quantities in the United States and Great Britain. The one kind is simply a condensation of milk, which has been obtained by depriving the milk of a portion of its water. This sort is prepared mainly for infants and invalids, and is adapted for almost immediate consumption only. The other (the common condensed milk of commerce) is condensed and preserved milk to which has been added from 35 per cent to 50 per cent of its total weight of cane sugar. It is almost invariably sold in tin cans hermetically sealed. The sizes are one-half pound and one pound tins. So far, no method of preserving a simple condensation of milk without the addition of sugar has been successful in keeping it sound after the tins are opened.

2. The condensation of milk may be described as a reduction of $4\frac{1}{2}$ parts of milk into 1 part of condensed milk, to which should be added $\frac{3}{4}$ of 1 part of cane sugar. It will be readily seen that such a preparation cannot take the place of whole milk as food for invalids or children; but it may be and is used extensively and acceptably for tea, coffee, the making of puddings, custards, &c.

3. The desirable qualities in a condensed and preserved milk are the absence of unpleasant cheesy or fermented taste or smell; the absence of undissolved sugar; the colour nearly white, with a slightly yellowish or cream tinge; and such a consistency of body as will dissolve readily and completely in about 4 parts of cold water without the presence of any flocculent specks of curd or fat.

4. The trade in condensed milk in Canada is a rather small one. Almost the entire local consumption is met from the supply from the milk-condensing establishment, at Truro, N.S. For the year ending June, 1890, the value of the condensed milk imported and entered as for home consumption in Canada was $119.

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The following table shows the imports of condensed milk into Great Britain for 1890:—

| | Cwts. | |
|---|---|---|
| Norway | 61,244 | £124,472 |
| Germany | 11,441 | 19,086 |
| Holland | 123,257 | 262,850 |
| Belgium | 28,750 | 68,586 |
| France | 180,149 | 365,004 |
| United States | 2,512 | 7,482 |
| Other foreign countries | 35 | 71 |
| Total from British possessions | 38 | 74 |
| | 407,426 | £847,625 |
| 1888 | 352,332 | |
| 1889 | 339,892 | |

This trade in Great Britain is a constantly growing one. The trade in food products always waits upon the superior quality of the articles or commodities which are offered. I am convinced that Canada offers excellent opportunities for a very large extension of the manufacture of condensed milk. This is a product which can be transported a long distance safely and at a small percentage of its value for transportation charges. The "Reindeer" brand, produced at Truro, N.S., is evidence that an excellent quality of milk can be produced here.

5. In regard to qualities, the following are the comparisons which I made when the cans were opened:—

"Reindeer," from the Condensed Milk and Canning Company, of Truro, N.S.:

Flavour—Nearly the natural flavour of sweetened milk, fresh and clean to the taste, slightly scalded or "boiled" flavour. In this respect, slightly better than the "Fruit" brand from Messrs. Cleeve Bros., of London and Liverpool, and very much superior to the "Shamrock" brand from the same firm.

Body, or consistency—Uniform and apparently wholly soluble.

Odour—Agreeable, not at all fermented.

Colour—White, with a yellowish or cream tinge.

"Shamrock," from Messrs. Cleeve Bros., London and Liverpool.

Flavour—Cheesy taste.

Body—Apparently wholly soluble.

Odour—Fermented odour or strong smell of yeast.

Colour—White, with a slightly bluish shade.

Decidedly inferior in quality to the other two samples.

"Fruit" brand, from Messrs. Cleeve Bros., London and Liverpool:

Flavour—Much like the "Reindeer" brand, but not so delicate and fine.

Body—Apparently wholly soluble.

Odour—Smells slightly like yeast.

Colour—Natural, with a slightly yellowish tinge.

6. For the guidance of those interested, I may state that the patrons who furnished milk to cheese factories in Ontario for the past three years realized on an average at their own milk-stands about 70 cents per hundred pounds net; 450 pounds of milk, 75 pounds of granulated sugar, plus the cost of collecting the milk, manufacturing and marketing the product, would yield 100 pounds of condensed preserved milk. The contract selling price in England for such milk in 1 pound tins is usually about 38 shillings, or $9.12 per net 96-pounds' case.

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# REPORT OF THE ASSISTANT DAIRY COMMISSIONER.

(J. C. CHAPAIS, ESQ.)

ST. DENIS, P.Q., December 31st, 1891.

To Prof. JAMES W. ROBERTSON,
Dairy Commissioner, Ottawa.

SIR,—I have the honour to present you my annual report for the year 1891, in my capacity as Assistant Dairy Commissioner for the Dominion.

I have had to give my attention this year wholly to the Province of Quebec, which I have travelled almost all over, as you will see in the detailed account of my work which I give you lower down.

## SUMMARY OF MY OPERATIONS FOR THE YEAR 1891.

Before telling you about the information I have been called upon to give, I will make for you a summary of my visits, in this small table, indicating the several counties and the different localities in each county where I went in the course of the present year.

TABLE OF THE LOCALITIES VISITED IN THE YEAR 1891.

| COUNTY. | LOCALITY. | COUNTY. | LOCALITY. |
|---|---|---|---|
| Arthabaska. | St. Norbert. | Megantic. | Somerset. |
| " | Warwick. | Missisquoi. | Stanbridge Station. |
| Bagot. | St. Hughes. | Montmagny. | St. Thomas. |
| " | St. Liboire. | Montmorency. | Ste. Anne de Beaupré. |
| Beauce. | St. Georges. | Napierville. | St. Cyprien. |
| " | St. Joseph. | Nicolet. | Gentilly. |
| Berthier. | St. Gabriel de Brandon. | Portneuf. | Les Ecureuils. |
| Champlain. | St. Anne de la Pérade. | " | Point-aux-Trembles. |
| " | St. Tite. | " | St. Basile. |
| Charlevoix. | St. Paul's Bay. | Quebec. | Quebec. |
| " | Murray Bay. | Richmond. | Castlebar. |
| Chateauguay. | Ste. Martine. | Rimouski. | St. Fabien. |
| Chicoutimi. | Chicoutimi. | Rouville. | L'Ange Gardien. |
| Compton. | Ste. Edwidge de Clifton. | " | St. Césaire. |
| Deux-Montagnes. | St. Hermas. | St. Hyacinthe. | La Présentation. |
| Kamouraska. | St. Denis. | " | St. Hyacinthe. |
| Lake St. John. | Hébertville. | Shefford. | Roxton Falls. |
| " | Roberval. | " | Waterloo. |
| " | St. Jérôme. | Sherbrooke. | Sherbrooke. |
| " | St. Prime. | Stanstead. | Barnston. |
| L'Assomption. | L'Assomption. | " | Coaticook. |
| L'Islet. | L'Islet. | Témiscouata. | L'Isle Verte. |
| Lotbinière. | St. Flavien. | Verchères. | St. Marc. |
| Maskinongé. | Pont de Maskinongé. | Yamaska. | Baie du Febvre. |

## OBJECTS OF THESE VISITS.

My visits, as indicated in this table, were made with four different objects in view:—

1. In some places I have been invited to deliver lectures on agriculture in its relation to the dairy industry.

2. Elsewhere my co-operation has been requested to help in the organization of factory syndicates.

3. The most important part of my work has been a journey in company with an expert in the manufacture of butter and cheese, to give theoretical and practical lessons on the best methods of handling milk.

4. Lastly, I have been invited to visit agricultural exhibitions, and deliver at these exhibitions lectures on dairying.

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The fact of having different objects in making my visits has brought me to visit a few localities more than once; this explains why the total number of my visits is higher than the number of mentioned localities. I had thus to go twice to Pointe aux Trembles and St. Basile, in Portneuf County; to Coaticook, in Stanstead County; to St. Hyacinthe, in St. Hyacinthe County; and to Baie du Febvre, in Yamaska County.

### FIGURES IN REFERENCE TO MY VISITS.

To finish this detail, I will add before going further, that I have made 54 visits, in 48 different localities, situated in 34 counties. During these visits lectures, lessons in dairy work, and sometimes both, were given before 6,000 farmers, 142 cheese-makers, 26 butter-makers and 8 syndicate inspectors.

Besides the time occupied in my visits I have worked at arranging my special and annual reports, at the translation of the official reports and bulletins of our department, at the making out of a full and complete list of factories and of butter and cheese-makers of the Province of Quebec, and I have kept up a regular correspondence with a good number of butter and cheese-makers and farmers, to whom I have given information and sent documents such as bulletins, reports and circulars of our department; the whole of which makes a total amount of about 2,000.

Perhaps you will notice that, though the number of my visits for this year is larger than the number of my last year's visits, the number of farmers I have met is smaller. This comes from two causes: The first is that 10 out of the 54 visits made this year were made specially for the organization of factory syndicates and were attended only by factory owners and butter and cheese-makers; the second is that, at the meetings held from the 15th of July to the 5th of August, 13 in number, I have met but a very small number of people, this time being the hay-making season, and consequently farmers are kept at work during all the day and also the evening in the field during that period.

I will now try to give you an idea of the information I have given during my visits.

### THE DAIRY INDUSTRY IN ITS RELATION TO AGRICULTURE.

I have been invited to give these lectures in eleven localities situated in nine counties, as follows:—

| COUNTY. | LOCALITY. | COUNTY. | LOCALITY. |
|---|---|---|---|
| Arthabaska. | Warwick. | Napierville. | St. Cyprien. |
| Beauce. | St. George. | Portneuf. | Les Ecureuils. |
| Champlain. | St. Tite. | do | Pointe aux Trembles. |
| Compton. | Ste. Edwidge. | do | St. Basile. |
| Lake St. John. | Roberval. | Stanstead. | Coaticook. |
| Montmorency. | Ste. Anne de Beaupré. | | |

I give here a summary of the lectures on agriculture in its relation to the dairy industry which I have delivered in the different localities:—

*Considerations on the causes of Land Impoverishment by bad culture.*—Land becomes poor from culture, because it yields its own substance to the crop.

Culture of grain and hay to be sold on markets impoverishes the land more than the culture of grain and forage grown to be fed to the animals of the farm.

A proportion of only about 15 per cent of the substance of forage and grain fed to cattle is assimilated by the eater, and almost all the remainder, *i.e.*, nearly 85 per cent is given back, in the shape of manure to the land.

On the contrary, grain and hay sold in the markets leave only straw to the land, and consequently make it much poorer.

In the Province of Quebec, grain culture pays no more because most of the farm lands are exhausted and give only very poor crops, and therefore cannot compete with the other provinces of the Dominion.



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Another reason which makes grain culture precarious in this province, is the variability of temperature during the season of spring which causes often late frosts and during autumn which brings early frosts.

We must then look for another source of revenue enabling us to overcome those variations of temperature and to return to the land, to a certain extent, its fertility while giving more profit to the farmer.

*Cattle Raising is easily done in the Province of Quebec. For what object should that cattle raising be made?*—The climate of the Province of Quebec is perfectly adapted for forage culture and enables the farmer to keep plenty of cattle.

What kind of cattle is to be kept? Is there any profit in raising cattle for meat production, in this province? The answer is no, for almost all the districts of the province. The farmer who wants to feed for meat is obliged to keep his cattle in the stable during 8 months, on account of climatic inclemency. He must, therefore, make an ample provision for fodder for these 8 months, and feed plenty of grain, which costs him very much, owing to the poor crops yielded by the land. This puts the production of meat at too much cost, taking into consideration the price of food, the work required by that long wintering in the stable, and the result is that he cannot make any profit in selling his meat at the low price at which he is able to sell it.

*Advantages of the Dairy Industry. Measures taken to render it prosperous.*—There remains for us in the dairy industry, the raising of cows for the production of milk, and the manufacture of that milk into butter and cheese.

Being convinced of the importance of that industry our legislators in the Federal as well in the Provincial Legislature deemed it expedient to give to it as much assistance as possible. Hence the creation of a dairy department affiliated with the Ottawa Central Experimental Farm; the appointment of special officers entrusted with the mission of furthering the interest of that industry; the granting of large sums of money to help on the organization of dairy associations, butter and cheese factories syndicates, and a system of inspection of factories and of the product which they manufacture.

*Considerations on the Dairy Cow.*—The cow is the basis of the dairy industry; but there are various breeds of cows. Some breeds are only fit for meat production and are quite useless for the dairyman. Others are essentially dairy breeds, such as the Ayrshire, the Jersey, the Guernsey and the Canadian (French).

Of these dairy breeds those best adapted to the ordinary class of farmers are the Ayrshire and the Canadian. The Ayrshire is a fine cow, of good size and giving a large flow of milk; but it requires good care, and if once neglected, it is very difficult to bring her back to her large milk production. On account of that, it can be recommended only to the well-to-do farmer who can always give her the best of care and food.

The Canadian cow of French origin, is truly the best cow for the Province of Quebec. Small in size, hardy, good milker, she possesses all the qualities adapted to our severe climate. Well taken care of, she gives an abundance of very rich milk and is equal to the best Ayrshires, while being much more easily and economically kept.

It is not sufficient to choose a good breed. It is also necessary to know how to choose the best milkers of the breed. To come to that: From the best milkers only should be selected and mated with the best milkers of the breed, and the offspring from these should be carefully raised. The calf of a bad milker is generally finer at its birth than the calf of a good milker, because the mother having given but little milk has had a chance to give more substance to her calf. We must therefore resist the temptation always felt to raise those calves which are the biggest at their birth.

The cow, after it is selected, must be well fed and to feed her well we must obtain what is needed from the farm.

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To get from the land good pasture and good forage crops, we must treat it well. That treatment consists in returning to it in manure what has been taken from its substance by the preceding crops, in order to enable it to continue to produce without becoming exhausted.

*Manure: its value; its preparation; its preservation; its use.*—Good manuring can be made only with all the refuse matter on the farm, well prepared and well preserved and with a surplus of fertilizing matters to make up for that part of the crops which the animals have retained for their sustenance and their milk production.

Some precautions must be taken in order to prepare and preserve the farm manure. The liquid of the manure (urine) is very rich, but unfortunately is always lost to the greatest number of our farmers. To retain it, it is necessary to provide for its absorption by the means of litter, and then it enriches the dung very much. Straw must be as little used as possible for litter, because when well prepared it may constitute a good part of the food of cattle. But sawdust and dry muck make good litter. Manure contains nitrogen, a substance which is easily lost by evaporation. A good way to fix it in manure consists in sprinkling on the stable floor some land plaster or some superphosphate. Manure must be kept in a place having a water-tight bottom, to prevent urine from soaking into the ground or flowing away. A good and cheap manure shed can be made with common rough boards, provided the roof is water-tight and the bottom, *i.e.*, the soil, is hollowed a little to form a kind of basin, which should be coated with about three inches of well beaten clay. Care must be taken not to draw manure on the land in little heaps in autumn or winter, and leave it exposed to the air. By putting manure under cover and spreading it on the land only when it can be immediately ploughed in, the rain, sun and snow are prevented from having any action on it, and then it keeps all its strength.

*The Law of Restitution.*—Manure thus preserved enables the land to give excellent crops without getting exhausted, provided sufficient supplementary fertilizers are added, when needed, as a compensation for that part of the fertilizing matter of the land assimilated by the animals eating the crop. We must never forget that the restitution to the land of the fertilizing matter assimilated by animals is strictly indispensable in a good system of culture.

*Care of the Cow.*—To obtain from the cow all the milk she is able to give, we must provide her with:—

1. *A good Pasture in the spring of the year.*—No good pasture nor good meadows can be had if forage seeds are not sown. They must be sown in abundance, specially clovers, red, alsike and white, timothy, &c.

2. *Green Fodder of good quality during summer.*—When pasture grasses mature in July they become, plentiful as they may be, less adapted to the production of milk; hence it follows that its secretion by the cow becomes less abundant. This is the time when green fodder is wanted. After having ploughed in on a piece of land, a good coat of manure in autumn, four bushels per acre of tares, oats, peas, rye, &c., according to the quality of the land, should be sown on that piece, the following spring. The result is that about the middle of July, a large quantity of green fodder is available for increasing the secretion of the milk.

3. *A winter feeding leading to the production of Milk.*—This alimentation may be given under various forms. There is an excellent one within the reach of all farmers. Its elements are: hay, straw, meal or bran. Hay comes into the ration at the rate of two-thirds against one-third of straw. The whole must be passed through the hay cutter. Three or four pounds of meal or seven or eight pounds of wheat bran are given to each cow with all she can eat of the mixture of cut hay and straw every day. The only preparation needed for that ration is this: put 24 hours in advance, a layer of cut hay at the bottom of a box, moisten it with water at about the temperature of the stable (60 Fah.), and sprinkle on it a little meal or bran, put then a layer of straw and treat it in the same way, and then alternately the layers of cut hay and straw, moistened and sprinkled with meal or bran, till the box is full. Put on a cover loaded with a heavy weight on the box, and leave the mixture undisturbed for 24 hours.



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Another form of winter feed for the production of milk is found in ensilage. I will not do more than mention ensilage here, a description of the system being given in the report of our department for last year. I will only repeat that ensilage ought not to be fed as a whole ration. We must add to it cut hay, straw, meal or bran.

With that system of summer and winter feeding milk is obtained from cows during ten months of the year and the production of butter in winter is insured at a season when that product is most profitable to the farmer.

*Example of a system of Culture for the Production of Milk.*—A system of culture for dairying with profit, in our province, while leaving to the land its fertility and furnishing the farmer what he wants for his own sustenance and the feeding of his horses, cattle, pigs, &c. consists in a mode of culture based on the following rotation, the trial of which has given excellent results:—

*First Year.*—Crop of oats, or of peas and oats (maslin) on pasture land ploughed the preceding autumn.

*Second Year.*—Ploughing in of manure in preceding autumn and crop of roots as cleaning crop or of green fodder or of fodder corn for silage.

*Third Year.*—Crop of barley and seeding of mixed clover seeds.

*Fourth Year.*—Crop of clover—autumn ploughing.

*Fifth Year.*—Crop of wheat. Seeding of mixed grasses for meadows.

*Sixth and Seventh Years.*—Crop of hay from meadow.

*Eighth Year.*—Crop of hay and top dressing of manure on meadow immediately after hay is carried away.

*Ninth Year.*—Crop of hay from meadow.

*Tenth, Eleventh and Twelfth Years.*—Pasture.

*Necessary details in the keeping of Milch Cows.*—Besides the food, cattle must get an abundance of good water, a temperate stable, well ventilated, well lighted, good attention with regard to cleanliness, dusting, currying and brushing.

1. *Abundance of Good Water.*—Ice-cold water is unsuitable for cattle and specially for cows in calf. It may be a cause of abortion. It occasions also a greater expense for food. It is unnecessary, therefore, to say that it is important to avoid the practice of sending cattle outdoors in winter to drink at the spring. On the other hand, there is no need to give hot or tepid water. Animals, the same as man, like to drink water which is neither too cool nor too warm.

2. *A Temperate Stable.*—A cow kept in a cold temperature eats very much without, however, giving milk. But heat in excess is also prejudicial; it interferes with the appetite of the cow and makes her weak. Sixty degrees (60° Fah.) Fahrenheit is about the temperature required.

3. *A well Ventilated Stable.*—Ventilators are of an absolute necessity for the good health of animals and also to get milk of good quality. Milk is always tainted in a stable which is not ventilated.

4. *A well Lighted Stable.*—Light is as necessary for beasts as it is for man and plants. A child who never sees the sun is weak and sickly. An animal kept in the dark has poor blood and becomes in a bad state of health. The sun is the generator of life.

5. *Attention to Cleanliness.*—An animal which lies sunk in his droppings always feels uneasy. A squalid and dirty cow is never in good health, because the pores of her skin are obstructed and prevent the production of natural perspiration. The floor of the stable must therefore be kept clean and cows must be curried, and combed or brushed.

All these conditions being fulfilled, we are sure to have healthy cows which will give during a long period plenty of good milk.

*Use of the Milk.*—What is to be done with that milk? It is clearly proved that the best system to use the milk in an economical and profitable way is the co-operative system, which consists in collecting the milk of several herds of cows in a central place to have it manufactured by an expert into butter or cheese.

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*Care of Milk.*—But, to get from this system all the advantages it offers, the farmer must bring to the creamery or cheese factory a first-class milk. What is called a first-class milk is milk drawn from a healthy cow, cleanly milked, strained, aerated, cooled in well cleaned cans and brought natural, without addition of water or subtraction of cream, to the factory.

*By-products of Milk.*—The farmer draws from the factory, besides the value of his butter or cheese, skimmed milk or whey. These products represent for him a good value, since it has been found out that one hundred (100) pounds of skimmed milk make five (5) pounds of increase in the live weight of swine, and that one hundred (100) pounds of whey make two (2) pounds of increase.

### LECTURES TO PROMOTE THE FORMATION OF SYNDICATES.

The Dairymen's Association of the Province of Quebec having obtained from the Provincial Government a special grant for the organization of butter and cheese factory syndicates, I have been brought to take an active part in that organization in my capacity as director of the society. Knowing the good results obtained from these syndicates and having been invited to co-operate in their establishment, as Assistant Dairy Commissioner, I have given my attention to it. My efforts together with those of the board of directors of the association have met with good success from the beginning.

For that work of organization, I have visited 7 localities distributed in 6 counties, as follows:—

| COUNTY. | LOCALITY. | COUNTY. | LOCALITY. |
|---|---|---|---|
| Bagot. | St. Liboire. | Stafford. | Roxton Falls. |
| Megantic. | Somerset. | do | Waterloo. |
| Quebec. | Quebec. | Yamaska. | Baie du Febvre. |
| St. Hyacinthe. | St. Hyacinthe. | | |

Here is a summary of the lecture to promote the formation of Syndicates which I delivered in these localities:—

*Progress of Dairy Industry.*—The dairy industry has made much progress in the Province of Quebec these last years, but it has much work to do yet.

*Bad Condition of the Butter Industry.*—It is with difficulty that some of our butter can be marketed on foreign markets. We must also look for a solution of the difficulties experienced in the exportation of that product, and there is much to do in that direction. Our exportation instead of growing becomes smaller.

*Considerations on the Cheese Industry.*—As to cheese, the position is much better. To-day our cheese has a good name on the English market, and we must do our best in order to make that reputation still better than it is.

*What Cheese is Wanted on the Foreign Markets?*—With what foreign buyers reproach us is specially want of uniformity in the manufacture and boxing of our cheese. The English market, in fact, requires, in order to be able to give the highest price for a lot of cheese, what follows:—

Uniformity in flavour.
Uniformity in quality, which must be the best.
Uniformity in texture.
Uniformity in colour.
Uniformity in appearance.
Uniformity in style and boxing.

And, indeed, the buyer is quite right in requiring all this. A lot of cheese in which are found cheeses of different flavours more or less agreeable, of all qualities from the best to the worse, of all textures from the dryest to the most sticky, of a most variable scale of colours, of all shapes and sizes and packed in boxes exhibiting different diameters and weights, and a more or less desirable quality of wood may be the source of heavy losses for the buyer, if he has not taken the precaution of leaving a wide margin between the buying price and the highest selling price of the last market where the cheese is to be sold.

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*Measures to be taken to give to the Market the Cheese looked for.*—To attain that desirable and necessary uniformity which enables us to put on the market no cheese but that of first-class, we must obtain for all cheese-makers a uniform mode of manufacturing and boxing. This can be obtained only by the means of a uniform system of teaching, coming from one source only. That is the principle from which syndicates originated.

*What is a Factories' Syndicate?*—A syndicate is the union of a certain number of factories subscribing each a given amount of money to pay the salary and expenses of an inspector interested in the work of visiting every one of the syndicated factories a certain number of times determined on during the season, and of giving advice and lessons of instruction to the makers. These inspectors test the patrons' milk, prevent fraud and delivery of bad milk, which is the most frequent cause of bad cheese. They hold their authority from the Provincial Dairy Association, which delivers them diplomas, after they have been accepted by a board of official examiners. A general Syndicates' Inspector gives them their instructions, and makes them follow a uniform direction. In this manner the end is surely attained.

It is of great importance to all factories somewhat anxious to see their products quoted at the highest price in the market, to join the organization of syndicates. And if all of us will lend a hand to organize those syndicates everywhere, before long Canadian cheese will be quoted on the English market as being of a uniform and first-class quality, in the full sense of the meaning.

*Work of Syndicates in* 1891.—Before closing the summary of this lecture, I will add that ten syndicates were in operation in the Province of Quebec this year, and have given excellent results. In one of them, the owners of some factories had a loss of $1,200 last year, because their cheese-makers had manufactured a second-class cheese. This year, after the organization of a syndicate, of which these factories were members, the same owners, with the same cheese-makers, have lost only $200, which shows a proportion of five-sixths in the way of advantage. In another syndicate, less money was lost this year in all the syndicated factories than had been lost in only one factory last year, before the organization of the syndicate.

Cheese buyers have stated to us in many places where, last year, they had to make a close inspection of all the cheese before buying, they could, this year, buy first-class cheese by telegram. And, to end this, it is one of these syndicate factories which, at the Dominion Exhibition of dairy products at Sherbrooke took, this year, the *sweepstake* prize over all the exhibitors from all the provinces of the Dominion.

### THEORETICAL AND PRACTICAL INSTRUCTIONS ON THE BETTER METHODS OF HANDLING MILK.

It had been understood in an interview I had with you, in Quebec, on the 26th of May last, that I would undertake a journey during the summer months, in the Province of Quebec, in company with Mr. C. C. MacDonald, one of the superintendents of experimental dairy stations, to give theoretical and practical instructions in the best methods of handling milk, to manufacture it either into butter or cheese. I prepared at once a circular, 1,000 copies of which were printed and distributed, giving notice that Mr. MacDonald and myself would visit some factories of the province as indicated.

Here is the text of that circular, with the programme of visits, which, however, has been somewhat modified by circumstances. Two distributions of that circular were made, one on 26th May, and the other on 26th June.

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## DOMINION OF CANADA.

DEPARTMENT OF AGRICULTURE.

JAMES W. ROBERTSON,
Dairy Commissioner,
Ottawa.

J. C. CHAPAIS,
Assistant Dairy Commissioner,
St. Denis, P.Q.

OFFICE OF THE ASSISTANT DAIRY COMMISSIONER,
ST. DENIS, P.Q., 25th May, 1891.

SIR,—These are the dates* fixed for the visits to cheese factories, in the Province of Quebec, by the Assistant Dairy Commissioner and one of the Superintendents of Experimental Dairy Stations.

The aim of these visits is to give instructions in the best methods of making the test of milk and of manufacturing cheese of superior quality, in as many places as possible, and as promptly as the thing is practicable. This work from place to place is done as preliminary to experimental investigations, which will be made in many factories, during the last period of the season of manufacture.

The Superintendent will take with him a Babcock test apparatus for the testing of milk, and other new and useful apparatus for helping cheese-makers to find out what is the quality and condition of the milk they have to manufacture.

All the cheese-makers of other factories in the different districts are invited to meet the Assistant Dairy Commissioner and the Superintendent, in the place which is the most convenient for them. A public meeting of the patrons and other interested persons can be convened by the cheese-maker or agent of the factory, at these factories for four o'clock in the afternoon of the dates indicated thus *. At these meetings a demonstration will be made of milk testing, and information will be given on the best methods to follow for the care and preparation of milk to be brought to factories.

All communications and reports on the subject of these visits should be addressed to the Assistant Dairy Commissioner, at St. Denis, P.Q.

I have the honour to be, Sir,

Your obedient servant,

J. C. CHAPAIS,

*Assistant Dairy Commissioner.*

I subsequently addressed to every owner or cheese-maker of the factories to be visited, a special circular of which I give a copy :—

ST. DENIS, KAMOURASKA, 1891.

Mr. ..... .....

DEAR SIR,—We have taken the liberty to assign your factory as a place of meeting for the cheese-makers of your district, for the , in order to make before them the test of milk and give them information on cheese-making. Please be kind enough to keep, on the morning of the day appointed for our visit at your place, twenty-nine (29) samples of the milk of twenty-nine (29) of your patrons and one (1) sample of the milk from the vat, taken before the rennet is put in. We hope that you will be kind enough to invite your patrons, together with those of the factories in your neighbourhood, to come to your factory, on that day, at four o'clock in the afternoon, to attend the public meeting and hear the lecture.

I have the honour to be, Sir,

Your obedient servant,

J. C. CHAPAIS,

*Assistant Dominion Dairy Commissioner.*

* NOTE.—For places and dates, see page 136.

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| County. | Parish. | Factory Owner. | Date. |
|---|---|---|---|
| Portneuf | St. Basile | Joseph Derome | *June 3-4. |
| do | Point aux Trembles | Cheese Factory Co | * do 4. |
| Champlain | St. Anne de la Pérade | N. E. Clément | * do 5-6. |
| Nicolet | Gentilly | Eusèbe Houlde | * do 8-9. |
| Yamaska | Baie du Febvre | Louis Lemire | * do 10-11. |
| Richmond | Castlebar | Taché & Freg | * do 12-13. |
| Arthabaska | St. Norbert | Germain St. Pierre | * do 15-16. |
| Lotbinière | St. Flavien | Lazare Bédard | * do 17-18. |
| L'Islet | L'Islet | Etienne Caron | * do 19-20. |
| Montmagny | Montmagny | N. Bernatchez | do 22-23. |
| Rimouski | St. Fabien | E. Hébert | * do 24-25. |
| Temiscouata | L'Isle Verte | Préfontaine et Frères | * do 25. |
| Kamouraska | St. Denis | Augustin Dionne | * do 26-27. |
| Beauce | St. Joseph | Joseph Lambert | *July 4. |
| Compton | Ste. Edwidge de Clifton | A. Gerin | * do 7. |
| Stanstead | Barnston | Chas. Wilkins | * do 8. |
| Bagot | St. Hughes | L. T. Brodeur | * do 9. |
| St. Hyacinthe | St. Hyacinthe | I. M. Archambault | * do 10. |
| Rouville | L'Ange Gardien | M. Bourbeau | * do 11. |
| do | St. Césaire | Isidore St. Pierre | do 11. |
| Missisquoi | Stanbridge Station | Julien Campbell | * do 13. |
| Verchéres | St. Marc | Alexis Chicoine | * do 14-15. |
| Chateauguay | Ste. Martine | A. E. Désautels | * do 16. |
| Deux Montagnes | St. Hermas | B. Beauchamp | * do 17-18. |
| L'Assomption | L'Assomption | School of Agriculture | * do 20. |
| Berthier | St. Gabriel de Brandon | Georges Dubault | * do 21. |
| Maskinongé | Pont de Maskinongé | Ayotte's Cheese Factory | * do 22. |
| Lake St. John | St. Prime | St. Prime Butter Factory | * do 25. |
| do | St. Jérôme | Damase Jalbert | * do 27. |
| do | Hébertville | Hudon Butter Factory | * do 29. |
| Chicoutimi | Chicoutimi | Maltais Cheese Factory | * do 31. |
| Charlevoix | Murray Bay | Joseph Bouchard | *August 3. |
| do | St. Paul's Bay | Charles Martel | * do 5. |

We began our journey the second (2nd) day of June, by visiting St. Basile, in Portneuf County, first point indicated in our programme, and we finished it on the fifth (5th) of August, at St. Paul's Bay, in Charlebois County, after having visited thirty-three (33) localities distributed in twenty-eight (28) counties.

*Character of our Operations in our visits.*—On entering the factory, Mr. MacDonald used to take the direction of the making for the day. After having found out by a close examination of the factory and its surroundings and by the inspection of the butter or cheese, what were the faults to reform, the difficulties to overcome and the ameliorations to make in the mode of fabrication, and the care to give to the manufactured products, we proceeded to give a practical lesson of manufacturing to the cheese-makers present. I used to make for him, in French, (as he was not familiar with that language), the theoretical demonstrations of his operations. It is in this way that we have demonstrated, amongst other things relatively new for those who were the object of our visits:—

1. *The Milk Test by means of the Babcock Tester.*—This apparatus is employed to determine, by means of sulphuric acid and a few easy manipulations, the richness of milk in fat. It is now in use everywhere, as well in Europe as in America and has been described in one of our bulletins for the current year.

2. *A method to find out at what moment Rennet must be put in Milk.*—This method (Harris' Rennet Test) consists in putting about one drachm (the eighth part of an ounce) of liquid of rennet in a gill of milk. It shows by the time taken by that milk to coagulate, if it is enough matured to receive the rennet.

3. *A method to find out the degree of Acidity of Milk.*—This is made by means of a substance extracted from coal-tar and called phenol-phthallein and this method is called Bond's acid test.

4. *Verification of Thermometers, Lactometers, &c.*—We used to make by means of our corrected instruments the verification of the instruments employed in the

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factories, and we have found that a good number of these instruments are defective and give false indications.

*Explanation and Lecture.*—Once the work of making was finished, all the explanations suggested by the day's operations were given in the most clear and simple manner and then I used to deliver a lecture to the patrons of the factory invited for the occasion.

This lecture was a condensation of those of which I have given a summary in the present report, and can be briefly recapitulated as follows:—

*Necessity for the dairyman to produce the Greatest Possible Quantity of Milk in the cheapest possible way.*

*Means to obtain that result.*—Judicious selection of cows, good feeding, good care.

*Necessity for the dairyman to obtain the Greatest Possible Profit from his Milk.*

*Means to obtain that result.*—Production of a wholesome milk by drawing it from healthy cows, cleanly milked, by straining, aerating and cooling it and preserving it in strictly clean cans, and by bringing it whole and natural to the factory, without addition of water or removal of cream. Incitement given, by means of voluntary subscriptions to the maker to join a syndicate, in order to benefit by the lessons of the inspector and to make a first-class product for the market.

*Faults disclosed in these visits.*—The greatest faults that we have disclosed while visiting factories are indicated here:—

*Construction.*—Defect in the buildings which, too often, are not at all what is required for a factory.

*Curing-rooms.*—Bad curing-rooms in which it is impossible to control the temperature.

*Defective Instruments and Apparatus.*—In quite a number of factories we have found cheese-makers making from 1 to 4 degrees higher or lower than the correct degree. Many vats have not the required apparatus to draw *quickly* from it the whey when it is necessary, a thing that is often to be done.

*Cleanliness.*—Unhappily, we have found much negligence in this respect, as well amongst cheese-makers as amongst factories. Dirty milk, badly or not at all strained, not aerated, brought in unclean cans. Utensils of manufacture not well washed, especially curd mills. Pools of whey stagnant under the floors, in the gutters. Whey tanks unwashed, placed too near the manufacturing or curing-room, slovenliness in the wearing apparel of the makers.

*Negligence in Working.*—A good number of makers, specially the young ones and apprentices, have an inclination to do their work in haste, without following the rules of good manufacture, which most of them know but take no notice of, in order to get clear of their work sooner.

Of course we strove against these faults, which happily are not found everywhere, indicating what was the remedy for every one of them.

If we have found faults, we have also met with what, if it is not perfection, is very near it. And, as praise is always more welcome than blame (though we give the name of none of the factories in fault), I think it is well to mention here two factories which certainly are very creditable to their owners and can be cited as models. It is for that reason that I name the butter factory of Messrs. Préfontaine Brothers, of l'Isle Verte, Temiscouata County, and the cheese factory of Mr. Charles Martel, of St. Paul's Bay, Charlevoix County.

I don't enter into the details of the tests and experiments made in each factory, Mr. MacDonald having kept a special and complete diary of his operations.

*The Babcock Test and the Payment of Milk by its Value in Fat.*—Before finishing this part of my report, I think fit to give as an indication of the good results of our visits, the purchase of several Babcock testers by syndicate inspectors, who find this machine to be one of the most useful as well as the most simple to put in operation. In fact, it is considered one of the best means to prevent fraud in the delivery of milk. They all say, by common consent, that its use will soon give the means of paying for the milk of each patron according to its true intrinsic value.

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VISITS TO EXHIBITIONS.

I have visited this year only two exhibitions, those of Coaticook and Sherbrooke. I have been prevented from continuing my visits during the exhibition season by circumstances out of my control, which I have since indicated to you.

*Great Exhibition of Dairy Products at Sherbrooke.*—You have been in a position to judge by yourself, *de visu, tactu et gustu*, of the importance of the Sherbrooke exhibition from the dairying point of view. Ten years ago, nobody would have dared to anticipate such a splendid display of the products of that industry brought from all the provinces of the Dominion. This show was well fit to give the best possible idea of the progress made during these last years by the dairy industry in the Dominion of Canada.

CONCLUSION.

In closing the present report, I am in a position to assure you that, as far as regards the French-speaking element, whose interests in the matter of dairy industry are under my care, there is a decided movement of progress and amelioration. This is made evident:—

1. By the attention paid by farmers to the stretching out and improvement of their pastures and meadows.

2. By the marked emulation brought into cattle raising for milk production, as well in relation with the augmentation of the number of cows, as in relation to the good attention given to calves and cows.

3. By the interest taken by farmers, factory owners and butter and cheese-makers in the publications made to promote the progress of the dairy industry, in the meetings where it is specially spoken of as the great industry, in the lectures and experiments made to give them information in all its branches.

4. By the always increasing number of butter and cheese factories organized everywhere.

5. By the zeal evinced for the organization of factory syndicates, which are recognized to be the best means to reach perfection in the manufacture of dairy products.

I am happy to be able to finish my report of this year, by this statement of the progress of the industry with the prosperity of which in the Dominion we are interested, and I submit it to you with the hope that it will give you full information as to my work for the year 1891.

I have the honour to be, Sir,

Your obedient servant,

J. C. CHAPAIS,

*Assistant Dairy Commissioner.*

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# PART IX.—REPORTS OF SUPERINTENDENTS OF EXPERIMENTAL DAIRYING.

## (1) Report of Thomas J. Dillon.

James W. Robertson, Esq.,
Dominion Dairy Commissioner,
Ottawa.

Sir,—I herewith submit my report for the season of 1891:—

My first work was done at the Salford factory on the first day of May. The first experiment was that of "low cooking," or "Grant" process. It followed work of a similar kind that I had been doing for Jas. L. Grant & Co., at the same factory. The milk was set at 84° Fah., and sufficient rennet was put in to coagulate it fit for cutting in 15 minutes, when it was cut into cubes a little smaller than dice. It was then stirred very carefully for about 20 minutes before applying the heat, after which we gradually raised the temperature to 87°, drew off a good share of the whey, and, as soon as acid was discernible, drew off the remainder and dipped the curd into a sink with strainer-cloth and slats. The acid developed and the curd ripened in good time, was milled, salted, and put to press in the ordinary way. I saw the cheese from time to time afterwards, and they were fine in every particular, with the exception of being a little soft, which defect might have been remedied by using a half pound more salt to the 100 lbs. of curd. The amount of salt used was $2\frac{3}{4}$ lbs. to the 1,000 lbs. of milk.

My next instructions were to meet the other Superintendents at the Brownsville factory, where we were to make cheese together for a few days and exchange ideas on all points that might prove beneficial in the after work. Mr. Ruddick's report will contain an account of the work done at Brownsville.

The next step was to visit the following factories according to a programme given me, viz.:—Galloways, near Ingersoll, 18th and 19th May; Newry, Perth County, 20th and 21st May; Bluevale, Huron County, 22nd and 23rd May; Goldstone, Wellington County, 25th and 26th May; Harriston, 27th May; Kenilworth, 29th May; Dundalk, Grey County, 1st and 2nd June; Cookstown, Simcoe County, 3rd June; Attercliffe Station, Haldimand County, 4th and 5th June. I was invited by telegram to visit Forks Road factory, and did so on the 6th of June. A visit to Norwich, on 9th and 10th June, was the last on the programme. I also visited Brownsville, Bayham, Burnside, Belmont, Booth's Corners, Culloden, Cotswold, Chatsworth, Dunns, East and West Oxford, Fewsters, Gore, Gladstone, Geary's, Laurel, Mount Elgin, Mount Forest, Nancekivell's, Red Star, Simmons', Springfield, Salford, Shelburne, Smith's, near Norwich, Tilsonburg, Wilkinson's, West Nissouri and a factory near Drumbo, making 40 in all.

### *Objects of Visits.*

The object of these visits varied according to the different factories and cheese-makers. The first visits were made to give instruction in cheese-making, to tell the patrons the best means of producing and caring for milk; and to show them the workings of the Babcock testing machine, and the Lactometer. Later in the season quite a number of visits were made to give instruction in cheese-making only.

### *Testing Milk.*

I tested milk at nearly all the factories named, and found some that tested as high as 5 per cent butter-fat, and some as low as 1·60 per cent. As my time was

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nearly always arranged for ahead, I wrote to all those whose milk I found below 3 per cent, informing them of it, and telling what the vat tested—which was from 3·30 per cent to 3·70 per cent—and advising them also that there were four men travelling all the time in Ontario, west of Toronto, whose duty it was to test milk, and if they found anything wrong, follow it up by a prosecution. At the factory where I found the milk having so small a percentage of butter fat as 1·60, I went out and saw the cows milked night and morning, and took samples of each mess, which, when tested, showed 3 per cent butter-fat. I laid the necessary information before a magistrate, and the matter was finally settled with the directors by the patron forfeiting his milk for the month of July and paying the costs. Another patron of the same factory, whose milk tested 2·30 per cent, acknowledged he had taken some cream off for his tea and porridge, and was let go on suspended sentence by the directors.

*Meetings.*

I gave an address on the production and care of milk at twelve different factories. The attendance was good at most places where it was known the meeting was to be public. At Newry a great deal of interest was manifested. Nearly all the patrons must have visited the factory during the two days I was there, as well as the cheese-makers from Atwood, Brussels, Donegal, Ethel and Silver Corners. Other representative men were present. All were most hospitably entertained by Mr. Morrison, the proprietor of the factory.

At Bluevale the patrons turned out in large numbers, all determined to learn what was to be learned, and to do all in their power to keep the reputation of their factory where it is, second to none in the land. The interest here was such that the patrons were not only willing to have their milk tested, but wanted the inspector tested as well. One of the directors brought three samples of milk, which he had "fixed" at home, and asked me to test them. When I had pronounced on them, he acknowledged the correctness of the tests, and expressed himself as being well pleased. A great deal of the success of this factory may be attributed to the shrewd salesman, Mr. William Messer, and the able secretary, Mr. John Burgess, who makes his accounts so clear that every patron understands exactly what he is doing, and the buyers know when they buy the cheese that it will be carefully weighed, boxed, every box put on the invoice, and the value correctly figured out, which is a great satisfaction and convenience to all concerned.

At Harriston and Cotswold, Mr. John Prain took a lively interest and worked up quite a lot of enthusiasm, and a goodly number of patrons and others turned out.

At Kenilworth and Attercliffe Station the cheese-makers did not get notice in time to notify their patrons, so there were very few in attendance. At nearly all the other places the attendance was good.

Fifteen of the factories visited were thoroughly clean, seven very dirty and the remainder passable. I cannot do better than give some of the notes entered in my book at the time of visiting the factories.

1st. Cheese good; everything clean and tidy.

2nd. Cheese fancy; everything in good shape.

3rd. Everything neat and clean, but the cheese showed too much acid and over-cooking.

4th. Cheese fair; the maker understands cheese making, but is not thorough.

5th. Tested all milk and found it O.K. Cheese good.

6th. Everything neat and clean, but cheese not fine. Maker just started in section.

7th. Everything clean and neat, but cheese showed too much acid.

8th. The maker did not know how to make cheese.

9th. Factory anything but clean; maker knew how to make cheese but was altogether too careless. Water very bad.

10th. Everything in good shape; cheese very neatly finished, but showed too much acid.

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11th. Cheese showed lack of attention, and the factory was not clean. The maker could make fancy cheese if he would be thorough.

12th. Company needs everything new—factory, whey tanks, milk cans and cheese-maker.

I find at factories where the makers are careless and untidy the patrons are very apt to follow suit, and not be as particular about their cans and milk as they should be. I would impress thorough cleanliness on the makers and patrons, as one great requisite in cheese and butter making.

*Surroundings and Whey Tanks.*

Where the factory surroundings and cheese were not what they should be, I generally told the manager and proposed a remedy. The hardest matter of all was to get the whey tanks cleaned. In many cases they were so dirty and had been neglected so long that the makers did not much like the idea of trying to make them clean. I carried water and helped to scrub one that had not been cleaned for seven years. One can easily imagine it was no agreeable task. In another place, where the cheese on the shelves were badly finished on account of the press hoops not being clean, I scraped the hoops with a knife, and the maker, when asked how long since they had been cleaned, replied quite unconcernedly, "Fifteen years."

If the makers would burn their old boots, old vats, curd sinks and presses that have passed their day of usefulness, instead of putting them out in the yards, where they make a splendid harbour for weeds, burrs, &c., the factory surroundings would be greatly improved and they might then ask with a good conscience to have the buildings painted. The directors would be much more apt to do it if they saw an effort was being made to have the place neat and tidy.

*Locations, Buildings, &c.*

The majority of the factories visited were well located, being built on rising ground where water was easily obtained and admitting of free ventilation and good drainage. The buildings were generally good and in good repair, but very few of them were painted, which I think is a mistake. Very little thought seems to have been given to convenience and saving of labour in the planning of most factories..

*Patrons and Care of Milk.*

The patrons are taking a livelier interest in dairying on the whole and the larger quantity of the milk is generally sent in good condition. There are a few, however, in every section who are very careless as to the state of their milk when it reaches the factory. Quite a number of patrons get a great deal of very offensive matter in their milk by putting the pails on the ground while milking, and allowing what sticks to the bottom to drop inside the can when emptying the milk.

*Defects in Cheese.*

The principal defects in the cheese were too much acid, dryness, ragged holes and lack of finish. I took charge of a vat at nearly every factory visited, and did my best to assist the maker by showing him where he might improve. I am glad to say my efforts were appreciated and suggestions were taken kindly everywhere.

*Experimental Work.*

I went to Mr. Geary's factory on the 27th of July and got everything in readiness for doing experimental work by the 1st of August. A number of the patrons here were quite indifferent about the quality of the milk they furnished, and I had a good deal of difficulty getting them to take proper care of it. The results of the experiments go to show:—

1st. That the quantity of rennet used has very little effect on the yield or on the keeping qualities of the cheese. It is well, however, to use sufficient rennet to

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coagulate the milk fit for cutting in from 30 to 40 minutes as, unless the vat is carefully covered, the surface is very apt to get cool and cause some waste.

2nd. That 3½ lb. of good salt to the 1,000 lb. of milk may be used after June, without getting the cheese too dry or salty, if the curd has been cut coarse, handled carefully, and has carried a good deal of moisture.

3rd. That early milling of the curd is better than late.

4th. That fairly good cheese may be made by scalding or cooking at a lower temperature than we have been doing, viz., 98°.

5th. That milk rich in butter-fat will give a much larger yield of cheese than poor milk.

6th. That it is very seldom necessary to wait till noon for the milk to ripen, in order to get through with the work in daylight. I may add also, that according to my observations, if the air is dry the curd will be firmer, all other conditions being equal, at 94°, than it will at 98° if there is a lot of moisture in the air, and that the cooking of the curd should vary accordingly.

*Butter-making at Mount Elgin.*

We got the old cheese factory fitted up for butter-making and began operations on the 5th of December. There were 125,950 lb. of milk delivered from then to the end of the month, which yielded 5,335 lb. of butter-fat according to the Babcock test, and 5,891 lb. of merchantable butter, being an average of 21·38 lb. of milk to the lb. of butter.

We got more milk at first than we were able to handle to good advantage, and there were two days when we did not do good work with the separator.

The milk delivered in January was 49,495 lb. which yielded 2,141 lb. of butter-fat and made 2,390 lb. of marketable butter, taking an average of 20·70 lb. of milk to the lb. of butter.

It was generally understood with the patrons that we would pay for the milk according to the butter-fat, and if they wanted any cream they were at perfect liberty to take it off the milk before bringing it to the factory. The patrons are all well pleased with the results so far, many of them saying that the skimmed milk has been of sufficient profit to them, when fed to hogs, to pay for the extra feed the cows required, and the cows are in better condition than they would be if put dry and fed more sparingly. Very few of the patrons were in any way prepared for winter dairying, and we have not received milk from a single fresh calved cow. It has been the custom here to send the milk to the cheese factory till the beginning of December, then make butter for home use, and get the cows dry about 1st January. They are then fed on straw for about three months, or until it is necessary to begin better feeding to prepare them for the summer.

Dairying is the principal source of income with the farmers of this section, a great many of whom keep from 30 to 50 cows. Mr. Prouse, one of our all winter patrons and who has a cheese factory of his own three miles from here, has built a silo and provided himself with 400 tons of corn ensilage. He is wintering 70 cows. Very few calves are raised, the farmers preferring to kill them as they come and feed the milk to pigs till fit to be made into cheese.

*General Recommendations.*

I would recommend all cheese-makers to,—

1. Keep everything thoroughly clean;
2. Keep their curd knives sharp and in good repair;
3. Use a curd mill that will *cut* the curd and leave the pieces of a uniform size;
4. Keep whey tanks clean so as to get the full value of the whey as feed, and keep the acid from eating the tin off the cans;
5. Keep the boilers and engines clean and in a good state of repair. There is a great deal of money wasted in fuel on account of these things being neglected;
6. Burn all old rubbish and not allow it to collect in the factory yard;

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7. Take pride in keeping the surroundings neat and tidy;
8. Show at all the leading dairy shows;
9. Interview all patrons who do not send first-class milk; reason with and explain to them the necessity and advantage of having all the milk of the best quality. Expect to be snubbed once in a while and take it in good part, for plenty of people will know more about milk than the cheese-maker; remember it is necessary to do a certain amount of missionary work.

I would urge upon all promoters of factories the desirability of selecting a suitable location in which to build, and of equipping the factory with good plant and utensils placed in the most convenient positions. A great deal of inconvenience and unnecessary labour to the makers are caused by factories being badly planned. In most factories the boilers are too near the ground, and an ordinary sized man has to go on his knees when making a fire under them.

The factories should be painted.

I have had reports from nearly all the factories visited as to the better yield obtained from following my instructions. Two factories that were making twenty-two 66 lb. cheese per day, making a full cheese more out of the same quantity of milk and of a better quality than had been made previous to my visit. In nearly every case where the visits were made by request, the makers were able to get through much earlier in the day, which was a great saving of wood and labour. I think the day is not far distant when one lb. of good cheese will be made from 10 lbs. of milk.

I have the honour to be,
Your obedient servant,
THOMAS J. DILLON.

## (2) Report of J. A. Ruddick.

To Prof. Jas. W. Robertson,
Dominion Dairy Commissioner,
Ottawa.

Sir,—I have the honour to submit a report of work done during the year 1891.

As my engagement dates from 6th April, this report deals only with work done since that date.

### *Preliminary work.*

During the first month after I commenced my duties, I was employed at the Central Experimental Farm, Ottawa, testing milk in connection with the feeding experiments, which were being carried on at the time, and assisting to put the dairy building in working order.

On 5th May, acting under your instructions, I proceeded to Brownsville, Ont., where I met Messrs. John Robertson, T. J. Dillon, Jas. B. McEwen and C. C. MacDonald, all of the Dairy Commissioner's staff. We spent several days together in the cheese factory of the Brownsville Co., which is situated in the village, making some experiments with different rates of salt in the early cheese, and using the Babcock milk tester. The cheese made were afterwards sent to Ottawa to be kept in the dairy building at the Experimental Farm.

While at Brownsville, I visited along with different members of the party, the following cheese factories:—Campbelltown, Bayham, Culloden, Verschoyle, Wilkinson's, Dereham, and Maple Leaf.

### *Meetings.*

After leaving Brownsville, I went to Eastern Ontario where I visited cheese factories and held a series of meetings arranged for by the Dairy Commissioner.

These meetings created considerable interest, both among cheese-makers and patrons of factories. During the early part of the trip when the weather was cool and the supply of milk small, the makers in the neighbouring factories were able to

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close up for the day, and in this way as many as ten makers came to meet me at some of the places, but later on when the flow of milk was at its highest, and the weather excessively hot this could not be done. Generally speaking these factories are small, and at that time of the year, it is very seldom that there is more than one man in them capable of taking charge.

The matter of calling a meeting of patrons was left in the hands of the factory people, some of whom failed to make the necessary arrangements. As a consequence of this failure on the part of factory men, the total attendance was not as large as it would otherwise have been.

*Attendance.*

During the whole trip I met 69 cheese-makers, 4 inspectors, 8 cheese buyers, 23 factory managers, and about 500 patrons.

At these meetings the course adopted was to take as many samples of milk as was practicable for the Babcock test, to be tested in the presence of all assembled, while the process was explained as fully as possible.

I also took a hand in the cheese-making, and always suggested to cheese-makers and managers such improvements or changes as I considered necessary in or about the factory, or in the method of handling the milk. Where a meeting of the patrons had been called, I addressed them on the "care of milk for cheese-making," &c.

After finishing this work, I spent one week visiting factories in the counties of Stormont and Glengarry, for the purpose of giving instructions in cheese-making and milk-testing.

*Improvement in Buildings.*

Among other improvements, none is more marked than the improvement I found in cheese factory buildings, especially in the Brockville district. Among those which I visited, James Bissell & Sons', Algonquin, P. W. Strong's, Delta, and John Dickey's, North Williamsburg, are deserving of special mention. The first two named were new in 1891.

*Quality of Cheese.*

On the whole the quality of the cheese during the past season was superior to what it has been in previous years. (I am speaking of the section which I visited.) Part of this improvement in quality may be attributed to a favourable season; but it is very evident on all sides that the cheese-maker is year by year becoming better acquainted with the principles which underlie his work.

While the foregoing is true in a general way, I find a great deal of cheese that is far from being of the finest quality. The most common fault I met with, was an unclean flavour and weak body, especially in the early cheese. I shall speak of some of the causes under another head.

*Care and Cleaning of Utensils.*

Vats, vat-covers, sinks, sink-cloths, strainers, dippers, pails, &c., should all be thoroughly washed and scalded every day; but they are not always so treated. In fact there would seem to be a great many men who do not know what a benefit is to be derived from a generous use of *scalding hot* water. Water which is not too hot to bear one's hand in comfortably, is of no use for scalding purposes; and yet this is what I find many using. The water should be as hot as steam will make it, and the lack of such has a good deal to do with causing bad flavoured cheese.

*Thermometers.*

A good reliable thermometer is an indispensable article in a cheese factory, yet it is a very common thing to find them as much as 4 or 5 degrees astray. It seems to be a mere chance to get a correct instrument among the cheap kinds that are supplied by the trade at present.

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*Difference in Cheese-makers.*

I divide the cheese-makers into three classes.

First, we have a goodly number of men who are striving by every means in their power to turn out the best possible article they can—men who when they make a mistake are ready to acknowledge it and ever ready to learn how to avoid a repetition. Such men have no trouble to get along.

Then there is a class who seem to have reached the highest goal of their ambition if they succeed in making a cheese that will by "hook or crook" pass the inspection of the buyer. They can't see any advantage to be gained by striving to improve all the time, and if you criticize their cheese, they will always tell you that they sell for the market prices. No doubt they do, but the point I wish to make is this, that if this cheese were all up to the grade of the best makers, the average market price would be correspondingly higher.

There is quite a wide range of quality from the very finest or "fancy" cheese down to the point where the "culling" commences.

The third class of makers are those who are so utterly lazy and shiftless that they don't seem to care what the result of their labour is. You know them by their work and surroundings.

*Mistakes in Cheese-making.*

During the past season I found some cheese-makers making the mistake of over-ripening their milk before setting, thereby causing injury to the texture of the cheese and a loss in quantity on account of the curd not having time to become sufficiently firm before the whey is removed.

In the case of early spring cheese with a weak open body, I find the cause to be that of salting and putting to press too soon. A great many cheese-makers seem to think that in order to get a cheese which will cure quickly, it is necessary to treat the curd this way, while the fact is that the longer a curd is allowed to mature before salting and pressing, the sooner will the cheese made from it be ripe.

The curing process commences in the vat or sink. We check this rapid curing in proportion to the amount of salt we add, and the extent to which we lower the temperature.

Another mistake which I have noticed, is the use of too little rennet at all seasons.

*The Babcock Milk Tester.*

During the course of my itinerant work, during May and June, I tested 640 samples of milk by the Babcock method.

The highest per cent of fat found in any sample was 4·4.

The lowest per cent found in any sample was 2·6.

The average per cent of fat in all the samples was 3·44 per cent; 7 samples tested over 4·0 per cent; 14 samples tested lower than 3·0 per cent. There were three samples as low as 2·6 per cent. One of those samples contained about 15 per cent of water as indicated by the lactometer, and the other two were undoubtedly partially skimmed having a very high specific gravity.

*Experimental Cheese-making.*

On 8th July, I went to Perth to take up some experimental work in cheese-making, along the lines laid down by the Dairy Commissioner.

I clip the following paragraph from the Perth *Expositor* :—

EXPERIMENTS IN CHEESE-MAKING.

The "Riverside" cheese factory, owned by Mr. C. A. Matheson, and situated in this place, has been selected by Prof. Robertson, Dominion Dairy Commissioner, as



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a suitable place to carry on experimental work in cheese-making for a few months. As a result of this selection Mr. J. A. Ruddick, one of the superintendents of experimental dairy work on Prof. Robertson's staff, arrived in town last week to take charge of the work, bringing with him all the necessary apparatus to conduct the work successfully. One of the leading experiments and one of especial interest to patrons of factories, will be to determine the quantity and quality of cheese made from milk containing different percentages of fat. The Babcock tester will be used for ascertaining the quality of the milk as regards butter-fat. Many other experiments will also be undertaken in order to furnish cheese-makers and all interested with positive information on some points which at present admit of more or less argument and difference of opinion. About 5,000 pounds of milk will be used daily during the progress of the investigation. The "Riverside" factory is well adapted for this kind of work. The drainage is good, the water supply excellent and the building roomy, well ventilated, and so constructed that the temperature can be controlled at almost any point. Mr. Ruddick invites all cheese-makers and everybody interested to visit the factory, when he will be glad to give any information in his power relative to the work on hand. The Dominion Government are carrying on these experiments in two factories, one east and the other west of Toronto. The Perth factory is the one selected east of Toronto, and cheese-makers should not lose the opportunity of attending during the experiments which will be continued for about six weeks.

The experiments carried on were as follows:—

*First Series.*

1. To determine the quantity and quality of cheese made from milk having different percentages of fat;
2. The effect of using different rates of salt;
3. The effect of early *vs.* late milling or grinding of the curd;
4. The effect of hooping the curd at different periods of time after salting;
5. The effect of piling *vs.* not piling of the curd.

*Second Series.*

6. The effect of setting the milk at different degrees of ripeness;
7. The effect of high *vs.* low cooking of the curd;
8. The effect of using different quantities of rennet;
9. The effect of stirring and not milling *vs.* matting and grinding of the curd;
10. The effect of using extract of rennet *vs.* rennet powder.

In order to carry out these experiments it was necessary to have a vat constructed with three compartments of equal size, in each of which the temperature could be maintained at any point desired.

In addition to the special vat very little apparatus was required besides what is in use in an ordinary cheese factory.

No more work was undertaken at a time than that which could be given the closest possible attention; and realizing fully that inaccurate results are misleading and calculated to do more harm than good, every possible care was taken in the carrying out of this work with a view to make the conclusions reliable, as I believe they are.

I would be ungrateful if I failed to mention the ever ready and cheerful assistance which I received from the cheese-maker in charge of the factory, Mr. James McCann, and his helpers, as well as the faithful service of my own assistant, Mr. John R. Moore. Owing to their careful and painstaking help, I was able to prosecute the work more successfully than I could otherwise have done. Mr. C. A. Matheson, the proprietor of the factory, was always willing and ready to afford me every facility in his power.

In the first series of experiments the work was carried on in an ordinary cheese vat, with the exception of No. 1, when the three compartment or special vat was used. In order to get milk for this test containing different percentages of fat, and to secure as wide a difference as possible between the richest and poorest milk, each

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patron's milk was tested by the Babcock method for three consecutive days. Then by taking enough of the richest lots to fill compartment No. 1, enough of the poorest to fill compartment No. 3, while the remaining compartment received milk of about average quality, we had milk running from 4·0 per cent of fat down to 3·5 or 3·4 per cent. The greatest difference I was able to get between the milk in the different compartments was ·5 of one per cent. Duplicate samples of the milk in each compartment were tested every day.

In the second series of tests, the milk was first thoroughly mixed in one large vat, then afterwards divided and weighed into the experimental vat.

In making these cheese, I followed the system generally practiced throughout eastern Ontario. The work was all done in the vat, no sinks being used.

In keeping the record a form was used, showing the following particulars:—

## EXPERIMENTAL CHEESE-MAKING

At Perth Factory, 1891:—

Weather..... ..... .....
Condition of Milk..... ..... .....
General Notes.....

Lb. of milk,
Percentage of fat,
Specific gravity,
Degree of ripeness,
Other quality or condition of the milk,
Colouring used, quantity and kind,
Kind of rennet used,
Quantity of rennet used,
Time set,
Temperature set at,
Thick at,
Cutting commenced at,
Manner of cutting,
Stirring commenced at,
Heat applied at,
Heating ended at,
Temperature,
Acid discernible by hot iron test at,
Whey removed at,
Percentage of fat in whey,
Degree of acid by hot iron test after removal of whey,
Treatment of curd,
Degree of acid on hot iron at,
Temperature of curd at,
Milled at,
Temperature of curd,
Salted at,
Rate of salt used,
Kind of salt used,
Temperature of curd at salting,
Hooped at,
Temperature of curd,
Number of cheese made,
Weight of curd put in hoops,
Length of time in press,
Weight of cheese from press,
Marks on cheese.

CHEESE MADE FROM MILK HAVING DIFFERENT PERCENTAGES OF FAT.

| Date. | Lot A. | | | Lot B. | | | Lot C. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Per cent of Fat in Milk. | Specific Gravity of Milk. | Pounds of Milk for 1 lb. of Cheese. | Per cent of Fat in Milk. | Specific Gravity of Milk. | Pounds of Milk for 1 lb. of Cheese. | Per cent of Fat in Milk. | Specific Gravity of Milk. | Pounds of Milk for 1 lb. of Cheese. |
| July 15..... .. | 3·8 | 1031·4 | 10·69 | 3·6 | 1031·1 | 10·84 | 3·4 | 1030·6 | 11·56 |
| do 20..... | 3·9 | 1031·8 | 10·29 | 3·6 | 1031·5 | 10·71 | 3·4 | 1031·4 | 11·03 |
| do 21..... | 3·75 | 1031·5 | 10·57 | 3·50 | 1030·8 | 10·66 | 3·40 | 1030·8 | 11·03 |
| do 22..... | 3·8 | 1031·3 | 10·49 | 3·6 | 1030·9 | 11·16 | 3·5 | 1031·1 | 11·31 |
| do 31..... | 3·95 | 1031·9 | 10·23 | 3·65 | 1031·0 | 10·66 | 3·55 | 1031·2 | 11·00 |
| Aug. 1..... | 4·0 | 1031·8 | 10·06 | 3·6 | 1031·4 | 10·59 | 3·5 | 1031·3 | 11·06 |
| do 6..... | 4·0 | 1031·5 | 10·34 | 3·8 | 1031·4 | 10·82 | 3·5 | 1031·0 | 11·32 |
| do 7..... | 3·8 | 1031·3 | 10·40 | 3·6 | 1031·2 | 11·04 | 3·5 | 1030·8 | 11·12 |
| do 8..... | 3·8 | 1031·5 | 10·52 | 3·5 | 1031·1 | 11·15 | 3·3 | 1031·0 | 11·52 |
| General averages.. | 3·86 | 1031·5 | 10·39 | 3·60 | 1031·1 | 10·84 | 3·45 | 1031·0 | 11·21 |



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The average number of pounds of milk to 1 lb. of cheese in this test, as well as in all the others, is calculated from the weight of the cheese on 17th October.

These cheese were all made alike as nearly as possible. In order to have uniformity in the work I did all the weighings myself, including the milk as well as the cheese.

DIFFERENT RATES OF SALT.

| Date. | Rate of Salt. | | |
|---|---|---|---|
| | 2 lb. per 1,000 lb. of Milk. | 2½ lb. per 1,000 lb. | 2½ lb. per 1,000 lb. |
| July 28 | 3rd. | 2nd. | 1st. |
| do 29 | 2nd. | 1st. | 3rd. |
| | 2½ lb. per 1,000. | 3 lb. per 1,000. | 3½ lb. per 1,000. |
| August 6 | 3rd. | Equal. | Equal. |
| do 7 | Equal. | Equal. | 1st. |
| do 8 | 3rd. | 1st. | 2nd. |
| do 22 | 3rd. | 2nd. | 1st. |
| do 24 | 3rd. | 2nd. | 1st. |
| do 25 | 3rd. | 2nd. | 1st. |

The examinations of the quality were made by Professor Robertson, and the order of merit was placed as in the columns above. (*See* note.)

MILLING AT DIFFERENT STAGES.

| Date. | Lot A. | Lot B. | Lot C. |
|---|---|---|---|
| | Time milled at. | Time milled at. | Time milled at. |
| | P.M. | P.M. | P.M. |
| July 27 | 3.50 | 4.30 | 5.25 |
| August 4 | 2.00 | 3.00 | 3.45 |
| do 19 | 2.40 | 4.15 | 5.02 |
| do 19 | 2.00 | 3.40 | 5.00 |

Note.—The cheese which were made under the different tests were judged by a scale of points upon three different occasions. The publication of the full details and conclusions is reserved until after another season's experiments have been conducted.—J. W. R.

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Examined by Professor Robertson, 14th October, and ranked according to merit as follows:—

| Date. | Lot A. | Lot B. | Lot C. |
|---|---|---|---|
| July 27 | 2nd | 3rd | 1st |
| August 4 | 1st | 2nd | 3rd |
| do 19 | 1st | 3rd | 2nd |
| do 19 | 1st | Equal. | Equal. |

HOOPING AT DIFFERENT STAGES.

| Date. | Time salted. | Lot A. | Lot B. | Lot C. |
|---|---|---|---|---|
| | | Time of hooping. | Time of hooping. | Time of hooping. |
| | P.M. | P.M. | P.M. | P.M. |
| July 30 | 4.50 | 5.00 | 5.15 | 5.35 |
| August 4 | 4.30 | 4.50 | 5.15 | 5.30 |
| do 13 | 4.15 | 4.15 | 4.40 | 4.55 |
| do 14 | 5.20 | 5.20 | 5.40 | 6.00 |
| do 15 | 4.55 | 4.58 | 5.15 | 5.35 |
| do 21 | 3.45 | 3.50 | 4.10 | 5.00 |

Examined 17th October by Professor Robertson, and rated as follows:—

| Date. | Lot A. | Lot B. | Lot C. |
|---|---|---|---|
| July 30 | Equal. | Equal. | Equal. |
| August 4 | 1st. | do | do |
| do 13 | 1st. | do | do |
| do 14 | 3rd. | do | do |
| do 15 | 1st. | 2nd. | 3rd. |
| do 21 | 1st. | Equal. | Equal. |

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THE EFFECT OF PILING *vs.* NOT PILING THE CURD.

| Date. | Lot A, matted and piled high. | Lot B, matted and piled 4 or 5 high. | Lot C, not piled. |
|---|---|---|---|
| July 17 | Equal | 3rd | Equal. |
| do 18 | 1st | 3rd | 2nd. |
| do 23 | 1st | Equal | Equal. |
| do 24 | Equal | 3rd | do |

In this test lot A was piled as high as possible and turned quite frequently—every fifteen or twenty minutes. The original pieces of curd were about 6 inches square and 1 foot long, but on account of the high piling became flattened out to 1 inch or so in thickness. Lot B not being piled so high, the pieces retained more of their original shape. Lot C was not piled, but merely turned over and kept spread out, therefore it did not become "flaky" like the other lots. The temperature was maintained evenly in the different lots.

DIFFERENT DEGREES OF RIPENESS FOR SETTING.

| Date. | Lot A. | | | | | Lot B. | | | | | Lot C. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Time set at. | Time cut at. | Whey removed at. | Per cent of fat in whey. | Lb. of milk for 1 lb. of cheese. | Time set at. | Time cut at. | Whey removed at. | Per cent of fat in whey. | Lb. of milk for 1 lb. of cheese. | Time set at. | Time cut at. | Whey removed at. | Per cent of fat in whey. | Lb. of milk for 1 lb. of cheese. |
| Aug. 19 | 8·31 | 9·40 | 12·00 | ·20 | 11·02 | 9·46 | 10·36 | 12·00 | ·20 | 11·02 | 10·33 | 11·04 | 12·00 | ·20 | 11·15 |
| do 20 | 8·26 | 9·28 | 12·20 | ·19 | 10·59 | 9·35 | 10·20 | 12·10 | ·20 | 10·61 | 10·53 | 11·20 | 12·10 | ·22 | 10·64 |
| do 26 | 8·34 | 9·29 | 12·40 | ·15 | 10·22 | 10·01 | 10·42 | 12·40 | ·19 | 10·34 | 11·30 | 11·52 | 12·40 | ·20 | 10·20 |
| General averages | | | | ·180 | 10·27 | | | | ·196 | 10·32 | | | | ·206 | 10·66 |

The cheese were examined on 14th October, by Professor Robertson, and graded as follows:—

| Date. | Lot A. | Lot B. | Lot C. |
|---|---|---|---|
| August 19 | Equal. | Equal. | Equal. |
| do 20 | do | do | First. |
| do 26 | do | do | Equal. |

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In the above experiment the percentage of fat in the whey was arrived at by the Babcock test. I did not presume to read the test as closely as the results are given, but in my judgment there was an appreciable difference in the quantity of fat. In making the test I always took duplicate samples, and after the whirling was completed I poured the fat from one bottle into the other and gave it another short whirl; having doubled the quantity, it was much easier to read.

THE EFFECT OF DIFFERENT COOKING TEMPERATURES.

| —— | Lot A. | Lot B. | Lot C. |
|---|---|---|---|
| Cooking temperature | 101° | 98° | 95° |
| August 10 | 3rd. | Equal. | Equal. |
| do 11 | Equal. | do | do |
| ..... | 2nd. | 3rd. | 1st. |

POUNDS OF MILK REQUIRED TO MAKE ONE POUND OF CHEESE.

| | | | |
|---|---|---|---|
| August 10 | 10·90 | 10·75 | 10·73 |
| do 11 | 10·95 | 10·90 | 11·04 |
| do 12 | 11·13 | 10·99 | 10·97 |
| General averages | 10·99 | 10·88 | 10·91 |

Examined by Professor Robertson, 14th October.

DIFFERENT QUANTITIES OF RENNET.

Examined 14th October, by Professor Robertson, and graded as follows:—

| Date. | Lot A. | Lot B. | Lot C. |
|---|---|---|---|
| | 3 oz. of Rennet per 1,000 lb. of Milk. | 6 oz. of Rennet per 1,000 lb. of Milk. | 9 oz. of Rennet per 1,000 lb. of Milk. |
| July 28 | 1st. | Equal. | Equal. |
| do 29 | 2nd. | 1st. | 3rd. |
| August 22 | Equal. | Equal. | 3rd. |
| do 24 | do | do | Equal. |
| do 25 | 1st. | 2nd. | 3rd. |

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POUNDS OF MILK REQUIRED TO MAKE ONE POUND OF CHEESE.

| —— | Lot A. | Lot B. | Lot C. |
|---|---|---|---|
| July 28 | 10·82 | 10·79 | 10·82 |
| do 29 | 10·80 | 10·78 | 10·88 |
| August 22 | 10·91 | 11·08 | 10·98 |
| do 24 | 10·37 | 10·43 | 10·48 |
| do 25 | 10·44 | 10·30 | 10·28 |
| General averages | 10·66 | 10·67 | 10·68 |

THE EFFECT OF MATTING AND PILING OF THE CURD *vs.* STIRRING.

| Date. | Lot A. | Lot B. | Lot C. |
|---|---|---|---|
| | Matted, packed, piled. | Matted, packed, not piled. | Stirred, not milled. |
| August 3 | Equal. | Equal. | 3rd |
| do 4 | do | do | 3rd |

POUNDS OF MILK REQUIRED TO MAKE ONE POUND OF CHEESE.

| | | | |
|---|---|---|---|
| August 3 | 10·69 | 10·75 | 11·13 |
| do 3 | 10·75 | 10·82 | 11·29 |
| General averages | 10·72 | 10·78 | 11·21 |

The procedure in this test was the same as in No. V, with the exception that Lot C was not allowed to mat at all but was stirred until quite dry, and the tendency to mat gone. The particles of curd were as fine as peas or beans. All the lots were treated alike in every other respect.

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LIQUID *vs.* POWDER RENNET.

For this test the milk was all first mixed in one vat and afterwards divided equally into two compartments.

| Date. | —— | Lot A. | Lot B. |
|---|---|---|---|
| July 30..... | Per cent of fat in milk..... | 3·5 | 3·5 |
| | Specific gravity ..... ..... | 1030·7 | 1030·7 |
| | Kind of rennet used..... | Powder. | Hansen's extract. |
| | Quantity of rennet..... | 1½ measures per 1000 | 2½ ozs. per 1000. |
| | Set at..... .. ..... .. . | 9·17 | 9·17 |
| | Whey removed at..... | 12·00 | 12·00 |
| | Per cent of fat in whey..... | ·22 | ·20 |
| | Average pounds milk for one pound cheese .. | 11·11 | 11·07 |
| | Standing as to quality, 14th October..... | Equal. | Equal. |
| August 5..... | Per cent of fat in milk..... .... .. | 3·8 | 3·8 |
| | Specific gravity..... ..... | 1031·5 | 1031·5 |
| | Kind of rennet used..... | Powder. | Hansen's extract. |
| | Quantity of rennet.... ..... | 2 measures per 1000 | 3 ozs. per 1000. |
| | Set at..... ..... | 9·10 | 9·10 |
| | Whey removed at..... | 11·45 | 11·45 |
| | Per cent of fat in whey..... ..... | ·20 | ·17 |
| | Average pounds of milk for one pound cheese | 10·80 | 10·73 |
| | Standing as to quality, 14th October ..... | 2nd. | 1st. |

*Working Dairy at the Exhibitions.*

On the completion of this experimental work, I received instructions to go to Sherbrooke and assist in operating a working dairy under the supervision of the Dairy Commissioner, and in connection with the Exhibition of the Eastern Townships Agricultural Society and Dominion Dairy Show. Accordingly, on 27th August I went there in company with yourself, Messrs. J. W. Hart and C. C. MacDonald, to commence operations by getting the building and machinery in shape. We were furnished with a complete outfit for making butter and cheese and also testing milk. We made cheese on three days of the fair and butter on four days.

Judging from the crowds that were constantly in the building, the "Working Dairy" was one of the leading features of the fair. Many were the questions asked and answered, and information on butter and cheese-making, as well as testing milk, was disseminated.

The people seemed to be so deeply interested that it was a pleasure to answer questions and talk with them on dairy matters.

His Excellency the Governor General honoured the Working Dairy with his presence during his visit to the exhibition, and was shown through it. He took a deep interest in all the details as explained to him by the Commissioner.

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The "Victoria" Hand Power Cream Separator which we used in the Dairy was a great attraction in its working, inasmuch as a large majority of the people had never seen anything of the kind before. The Babcock Milk Tester also came in for a large share of attention.

From Sherbrooke the outfit was sent to Montreal and set up in the dairy building on the Exhibition grounds in that city; and the Dairy was "working" for one week during the Montreal Exposition. On the big days of the fair the crowd in the dairy building was so great that it was almost impossible to get through it at times.

As at Sherbrooke, His Excellency the Governor General paid us a visit.

*Work in the Eastern Townships.*

After finishing up the work in connection with the exhibitions, I received instructions to go to Dunham, Que., and carry on some experiments in the cheese factory there, similar to those which I conducted at Perth. I was taken sick, however, after getting everything ready and left the work in the hands of Mr. C. C. MacDonald.

*A winter creamery—on the cream-gathering plan.*

I next received instructions to go to Woodstock, Ont., and take charge of an experimental creamery there for the winter.

Arrangements had been made by the Dairy Commissioner, with the directors of the East and West Oxford Cheese Co., to carry on the work at their factory.

After putting on double windows and storm doors, and boarding up with matched lumber the space between the sills of the building and the ground, the place was quite warm enough for the coldest weather. The cheese vats were set to one side and a platform 10 x 14 ft. x 2 ft. 6 in. high was put up to carry the cream vats, giving them elevation enough to allow the cream to be drawn off directly into the churn. Besides the cream vat and the churn, the necessary machinery comprised, refrigerator cans for gathering cream, drivers' measuring pails, one No. 2 Curtis oil-test churn, and 1 Mason's power butter-worker.

*Plan of operation.*

The patrons are instructed to set the milk in deep-setting cans in ice-cold water. The skimming is done by the patrons, and when the driver comes along he pours the cream into his measuring pail,—which is exactly 12 inches in diameter—takes a note of the number of inches in depth of cream, and also takes a sample of the cream for the oil-test churn. The cream is then poured into the refrigerator can, where it has not been frozen in the coldest weather during a round taking 6 or 7 hours to complete.

Arrived at the creamery, the cream and the samples thereof are delivered to the butter-maker, who at once strains the cream into the vat through a cheese cloth strainer, and brings the temperature to the proper point to ripen the cream. That varies according to the condition of the cream as to its sweetness when received. The samples are put in a warm place and churned after about 18 hours; and the amount of butter as shown by the oil-test churn is placed to the credit of each patron.

The farmers of the neighbourhood were hardly prepared for winter dairying, but being live farmers and awake to their own interests, they determined to make the best of the opportunity. It was not expected at the outset that the creamery could be kept running much past the time of this writing, for the patrons, thinking of their usual practice informed me that the supply of cream would be exhausted by this time. It was expected, therefore, that a stop would have to be made for at least a month or six weeks, starting up again in February or March. The fact is, however, that patrons have been so well pleased with the results so far, that they have fed their cows much better than usual, and given their dairies better attention all

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around, with the result that the supply of cream is nearly as much now as it has been at any time since we started, while we have a sure prospect of having enough to continue on all winter.

The creamery has been visited by a large number of people of all classes. We frequently have farmers and their wives or daughters coming to watch the process of butter-making. Factory men who contemplate starting on the same lines in their own factories, take the chance of learning the requirements, while a number of cheese-makers have spent several weeks learning something of the art of butter-making.

I have the honour to be, Sir,
Your obedient servant,
J. A. RUDDICK.

WOODSTOCK, 31st Dec., 1891.

## (3) REPORT OF C. C. MACDONALD.

To Prof. JAS. W. ROBERTSON,
Dominion Dairy Commissioner,
Ottawa.

SIR,—I beg leave to submit the following report. My appointment took place on the 1st of May, 1891; I proceeded to Brownsville, Oxford County, for the purpose of meeting the other Superintendents before starting on our missions. While there, experiments were made in making cheese and testing milk, records of which have been sent in to Ottawa. After that I proceeded to the Province of Quebec where my work was carried on mostly in the French-speaking district, giving instructions in both cheese and butter-making and giving illustrations in the use of the Babcock milk tester. I visited 60 cheese and butter factories in all. I met and talked with and gave instructions to 152 cheese-makers and 14 butter-makers. I also held myself open to correspondence with cheese-makers. I feel assured that a great deal of good can be done in this way. I had no less than 21 correspondents on my list. I arranged to have them ask their questions by numbers; numbering each question, as one, two and three, and to be as brief in their remarks as possible. When a cheese or butter-maker expressed a desire to correspond I always invited him to do so, and I am gratified to know that to a large extent the result of my correspondence was fully up to my anticipations.

Making cheese on Saturday night is being carried on all over the Province of Quebec, with the exception, I believe, of Huntingdon County, and I had the opportunity of being present at some of the factories on Saturday nights. Although I did not like the idea of encouraging Saturday night and Sunday work, I usually remained with the makers to give them instructions for handling of Saturday nights milk for cheese-making. Saturday nights cheese can always be detected by the buyers. I have learned from different sources that the makers were greatly benefited by Saturday nights visits. My method of preparing the milk for setting, was to put a man on each side of the vat with a pail dipping the milk steadily while it was coming in until the milk was cooled down to 70°, having all doors and windows open while the dipping was going on. Then the milk was heated to 90° and allowed to mature to 20° acidity by the rennet test. This of course is a long process, but I found it the only way to success with such new milk. I must add with regret that the French-speaking farmers have not heretofore made use of the aerator or any other means of airing or cooling milk; but now they are beginning to see the necessity. In some parts they are making use of them, but to a limited extent as yet. I feel assured (and I look forward with pleasure to the future) that success awaits the French-speaking farmers of Quebec. I see a difference in the ancient province, from what it was but a few years ago. I was well received by all farmers and cheese-makers. They were all anxious to hear what I had to say to them and listened most attentively at all meetings.

I had the pleasure of travelling with Mr. J. C. Chapais, Assistant Dairy Commissioner, for nine weeks. We made a very profitable tour down the Intercolonial railway as far east as Rimouski County, all along the north shore and south shore

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of the Canadian Pacific Railway down to Lake St. John region and down the beautiful far-famed Saguenay River. We travelled in the neighbourhood of 4,000 miles by rail, steamboat and carriage; and upon one occasion we crossed the St. Lawrence at Champlain in an open boat. When we were within a hundred yards of our landing place, we were informed by our boatman that he would have to land us on his back; so we even travelled on a man's back.

*Cheese Factories.*

The cheese factories in Quebec, like Ontario, are in most cases poorly constructed and poorly equipped. I found very few factories that were suitable for making cheese in at all seasons of the year. Proper attention has not been paid to this part of the dairy interests of the province. A few factories, of course, are in good order, but most all the factories that I visited were very open in construction, and the drainage was very poor. Some had no drains running from them at all; and one can always tell that there is a cheese factory within at least a quarter of a mile in cases of no drainage. I do not lay the blame to "not knowing how," but to carelessness on the part of the factories' owners. Again, the factories are small, and there are too many factories for the number of cattle kept for dairy purposes. If factory men would only amalgamate and throw two or three small factories into one, the business could be carried on much cheaper, and to better advantage every way. I found the factories very poorly ventilated, and some were all ventilation. The proprietor's plea for not having a better building, is that he cannot afford to build a better one; a very good reason I take it that he should not build one at all, but step out and let those who can and who have more enterprise than he. I do not wish to convey the idea that all the cheese factories in the Province of Quebec are inferior, for such is not the case. I have found quite a number of first-class cheese factories in the Eastern Townships, and kept in first-class condition. I found also some good factories in the French-speaking districts. My report relates chiefly to the French-speaking districts of the province, as my work was carried on principally in those parts of the province. I would like to name those factories that were properly managed and constructed, both of the French districts and the Townships, but space will not permit, but I think the idea would be a good one and would bring those who are delinquent, face to face with the real position in which they stand in the dairy world.

I found a great many of the factories dirty and very poorly managed, and makers in charge who were labouring under the terrible mistake that anything was good enough, so long as they got the goods off their hands. In nearly every case these makers are called upon to make up out of their own pockets, the losses caused by inattention to business, and a lack of knowledge of their business. Men who are engaged because they will do the work in a cheap manner, in many cases prove to be the most expensive. Small factories, where there is least do do, are generally the poorest kept factories. Wherever I found a woman in charge of a factory, I always found it in perfect condition. I had intended giving a special report of the factories where ladies were managers; but it would take too much space. We cannot have ladies in all our cheese factories, but we can have men who can and will exercise woman's pride in regard to cleanliness, and then the cheese industry will glide along more smoothly.

*Cheese-making Furnishings.*

I regret to have to state that I found a large number of cheese-makers using inferior materials for the making of cheese. Some bought them because they were cheap, while others bought them, thinking the goods were first-class. I have been in factories where 8 oz. of rennet extract were used per 1,000 lb. milk to coagulate it in proper time for cutting; and that rennet had none of the best of flavours. I make mention of these facts to show what has been and is going on, hoping that matters will be remedied. I found in most factories boxes of very inferior quality.

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A cheese box that contains less than 45 nails is not fit to put on a cheese. It is weak and will assuredly go to pieces before the package reaches the retailer's hands. If cheese-makers would pay the small sum of two cents extra for their boxes, they would get a much more desirable box, the cheese would have a much more desirable appearance when it reached Montreal or other markets, and they would realize, I am sure, at least a quarter of a cent per pound for first-class cheese, more than they would if the box were broken. I visited some of the warehouses one day while in Montreal, for the purpose of ascertaining the condition of the cheese on its arrival at the store-rooms, and I saw in shipments of a hundred or two hundred cheese, about one-fifth of the boxes broken or coming apart. An extra outlay of a cent or two per box would remedy all that trouble.

*Cheese-making.*

I was very much pleased to note the improvement in the quality of cheese over almost all the province, as compared with that of 1890. I take this from reports from the different buyers and what I had the opportunity of seeing myself. But although there is a decided improvement, there is still great room for further improvement. There are numerous fields for good instructors all over the country. The instructors in some cases in the province have done a good work. Mr. Robert Wherry's work is especially worthy of mention. By his unwearied attention and the exercise of skill in his duty, he has succeeded in raising the standard of cheese in his section. Consequently the prices are equal to those of Ontario. The dairy work is only in its infancy, but the people of Quebec are becoming alive to the fact that there is work for them to do, and they are going to do it. I attended forty-four meetings, where I took part in addressing the farmers and cheese-makers. I was gratified to know that the farmers looked upon our meetings with apparent great pleasure, and the meetings were largely attended by cheese-makers, butter-makers, farmers and townsmen, with the exception of a few meetings that we held in the latter part of July. Haying and harvest were fast coming on; it was impossible to get the farmers out, and it was thought best to discontinue holding meetings while they were so busy making hay.

*Marketing Cheese.*

I would like to say a few words upon the matter of putting cheese on the market. Cheese in Quebec, especially that of the French-speaking districts, has been for the past two years sold and shipped far too green. I know of cheese during the past season of which the make of the first ten days of August was bought on the 15th of August and shipped to Montreal. This is one great reason why Quebec cheese has not ranked in quality with that of sister provinces. I think that both salesmen and buyers are at fault for this, but I am inclined to lay more blame upon the shoulders of the buyer than upon the salesmen. Every farmer should know that a cheese cannot be fit for shipment under fifteen days old, and the cheese-maker for the sake of his own reputation should strongly object to having his cheese removed from under his care until the cheese are properly cured. Competition is so keen in some of the districts that all buyers are so hungry, so to speak, for cheese that they take them almost up to the cheese press.

*Butter Factories.*

The butter factories that I visited are better constructed than the cheese factories; but some of them were not kept as clean and tidy as they might have been. However, I was much pleased to visit one butter factory at Isle Verte, owned and managed by Messrs. Préfontaine Bros. I consider it a first-class butter factory both in its construction and in its management. Everything in and about the factory was kept in perfect order, pure, sweet and clean.

I had the satisfaction of testing the butter and found it of splendid quality.

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The power used for running the machinery in this factory is water power. The water used for washing of butter and dairy utensils is taken from a distance of 1,800 feet from the factory. The temperature as it comes into the factory is about 54°. A steam boiler is used for the purpose of heating water for cleaning purposes. All the churns, refrigerator, cream ripening vats, butter workers, &c., are manufactured by Messrs. Préfontaine Bros. themselves, and are very neat in their construction. I could see nothing lacking in this factory to make butter-making a thoroughly successful business. I would like to see all who are interested in dairying take the same pride in the management of their cheese and butter factories as Messrs. Préfontaine Bros. do; then there would be no room for fault-finding in any case.

*The Milch Cows.*

I noted with great pleasure the excellence of the dairy cows in almost every district in the province. In all parts of the French-speaking districts I found the milk very rich in butter-fat. I took 1,226 samples of milk which ranged all the way from 3½ per cent to 8 per cent of butter-fat. I found a number of samples that had been tampered with, and in every case so far as I have learned the transgressors have paid the penalty according to the magnitude of their sins. In mostly all the herds in northern Quebec may be seen a number of the Black Jersey, better known as the French Canadian cow; they are quite as ornamental as useful to any herd. In all the individual tests that I made of this class of milch cows, I found the quality very rich in butter-fat. At St. Norbert I had the pleasure of seeing one of the finest specimens of the Canadian cow that I ever saw. So much did this little beauty appear and take my fancy, that I went twice in one day to visit her. I took a sample of her milk and under very unfavourable circumstances it tested 5 per cent butter-fat. The cream came to the surface so quickly before I could get at the test, that quite a stiff cream had gathered, and became quite tough, so I did not get a fair sample.

At St. Jérôme, in the Lake St. John region, another sample of milk was brought in for a test; it contained 8 per cent butter-fat. I expressed a desire to see the cow that gave that milk, and was directed to where she was feeding. I saw her milked that evening at 6 o'clock, the milk was weighed and tipped the beam at fifteen pounds; this was on the 27th day of July. I was informed that the little cow had milked as high as twenty-five pounds at one milking. She is red in colour, very dark coloured hair around the eyes, very strongly built, weighing about 650 pounds, and five years old. This cow was for sale at $25. I also found a very valuable herd owned by Mr. J. C. Chapais, of St. Denis. The average per cent of fat for the herd was 4 per cent.

All through the Lake St. John district I found the average per cent of butter, taking the average of five factories, 4 per cent. I regret to say that I learned that these valuable little animals giving this milk are not properly cared for during the winter months. I was informed that these cows were fed on straw and refuse from the horse stables. It is wonderful how these little animals thrive and give the amount of rich milk that they do. The climate of northern Quebec is very cold in the winter months, and the cattle are but poorly fed, poorly housed and poorly cared for generally. If the farmers of Quebec would turn their attention more thoroughly to dairy farming and begin right where they are, with the breed of cattle they now have, and their natural facilities, they would in a remarkably short time attain great success in the dairy business. The Canadian cow is a much more desirable cow, to my mind, for dairy purposes in that cold climate, than the Ontario Jersey would be. They are hardier and better adapted in every way. They are accustomed to "rustling" for their living. Where the Canadian cow is crossed with the Ayrshire breed, they are a very valuable animal for cheese-making. The milk of some of the crossed breeds averaged 3·8 p. c. fat and they give large quantities of milk. I made special tests of herds as I went through my programme, in order to get an idea of the different breeds of cattle, and so far as my investigations were extended, I invariably

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found the crossed breeds of Canadian and Ayrshire to be the most desirable. There is certainly a great future for dairying in a great many parts of the Province of Quebec. Dairying, it is true, is only in its infancy in some parts of the province, but new factories are being started where two years ago there were none, and both cheese-makers and farmers are anxious to gain knowledge of the business.

*Lake St. John.*

I must say a few words in commendation of Lake St. John. Like the Eastern Townships, there are no greater facilities for dairy farming in the Dominion. The grasses of Lake St. John grow very abundant and nutritious, and the water supply is excellent from pure running streams and lakes. I took special notes of the crops in the different parts of the country as I passed through and the very best crops I saw of all kinds were in the Lake St. John district; those of the Saguenay region were also notable. I saw wheat and oats standing fully five feet high; and very strong wheat, oats, pease, barley, flax, corn and hay are grown very extensively there. I think wheat, pease and hay are the only crops that are grown with very great success, as the seasons are very short in that northern clime, and many of the slow maturing grains are apt to be caught by the early frosts.

I saw some excellent crops of corn growing, but I fear that the seasons are too short for making corn growing a success, except for feeding purposes. Early maturing ensilage corn would be an excellent crop. As yet Lake St. John and the Saguenay districts have very limited railway accommodation, but next year the Quebec and Lake St. John Railway will be extended as far as Chicoutimi, that is the only line of railway running through the northern part of Quebec, so one can plainly see that the inhabitants of that district have had very little chance or encouragement for improvement owing to the absence of transportation facilities. If fifty head of cattle can be kept on any one hundred acres of land in this Dominion, and I believe it is possible to do so, it can be done in the Lake St. John and the Saguenay districts. Mr. Chapais and I drove from Lake St. John to Chicoutimi, a distance of seventy-six miles, so we had a splendid opportunity of seeing the beauty of the country, and it is truly a magnificent country. The roads are very primitive as yet and very mountainous. Small horses are used for traffic, some not weighing more than from eight to nine hundred pounds. It is truly wonderful how they perform their work. In going down the mountain they run at full speed down, in order to get a send-off going up the other side. It is the driver's business to keep the horse in the road, and the passenger's business,—and he has his hands full too,—to hang on like grim death. I never knew one of those horses to make a stumble. It seems as though they were bred for those roads and hills.

There are magnificent forests along the line of the Quebec and Lake St. John Railway between Quebec and Roberval, and the scenery is most weird and beautiful with lakes, rivers, falls, villages and mountains. The road is 196 miles long, and it seemed to me that there was not a straight five miles in all that distance. The thrifty growth of the forest trees showed that there was rich soil there awaiting cultivation. We remained at Chicoutimi two days and occupied the time by giving lectures, testing milk and giving lessons in cheese-making; then a trip down the beautiful far-famed Saguenay. The trip was quite a recreation after our long journey across country. The scenery along the Saguenay is simply indescribable; one cannot have the faintest idea of it from reading. We made a stop at Murray Bay and Bay St. Paul, where we delivered the last of the series of lectures and instructions of our nine weeks tour. At this time of year, the latter part of July, it was impossible to get the farmers to attend meetings as they were into hay-making and harvest.

A word for the French-speaking farmers and cheese-makers is due them from me. I noted with pleasure and no small degree of satisfaction the attention we received at all our meetings. Both farmers and cheese-makers seemed anxious to learn and improve. We held but two meetings in English. I look for great improve-

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ments within the next few years in the French-speaking districts in dairy farming, and Ontario must keep her eye open in order to keep the lead in butter and cheese.

After leaving Mr. Chapais at Quebec I proceeded to go over some of the ground during the month of August, that I had previously covered, and visited factories where instructions were most needed. I was exceedingly pleased to note some improvements that had been made since my previous visit.

I found a great many cheese-makers making by what they termed a time system, which is impracticable and misleading to the average cheese-maker. If every cheese-maker were capable of ascertaining the exact condition of the milk he receives every morning and then governing himself accordingly, the time system would not prove so disastrous to the quality; but a great many cheese-makers get on the weigh stand and let all the milk pass through their hands and scarcely know, when they have received it, what the condition of their raw material is.

A very important feature in cheese-making is the ripening of the milk before setting. I was very much surprised to find so few cases where the practice of ripening was carried on and in most cases it was totally unknown.

The most practical test that could be demonstrated to ascertain the degrees of ripeness of milk was the measure or cup-test with rennet.

*Rennet Test.*

The rennet test (or, as it is commonly called, the cup test) is the most practical test for the average cheese-maker. It is used to ascertain the degrees of acidity of the milk or its ripeness for cheese-making. The test may be described as follows:—After the vat of milk has been heated to the desired temperature, take 8 oz. of milk from the vat (a teacup is the best vessel to manipulate the test in), add 1 drachm of rennet extract of known strength. Just before adding the rennet, take a watch in the left hand, and the teaspoon holding the extract of rennet in the right hand. When the second hand of the watch touches at some figure, drop the rennet into the milk in the cup and give the milk a sharp stirring for about 10 seconds to mix the rennet thoroughly with the milk. If the milk thickens in the cup in 25 seconds, it is not ripe enough for setting, and should be allowed to mature longer. From 20 seconds down to 15 seconds by the test, indicate the condition of milk most desirable for adding the rennet to the vat. The most accurate way of telling when the milk in the cup has been coagulated, is to put a small piece of burnt match or any small black speck in the cup before the rennet is added. By stirring the black speck is put in motion, and when this stops moving it is a sure sign that the milk is coagulated. After the operator has practised the test a few times, he will be able to manipulate it with accuracy.

I took particular care to have all the makers practice the test so that they could catch the first sign of coagulation to the second hand on the watch. It is just as important that a cheese-maker should have his raw material in proper condition for operating upon, as it is for the housewife to have her batch of bread in proper condition for baking. I would no more put rennet in a vat of milk before I had ascertained the degrees of acidity in the milk, than I would mill the curd when the hands of the clock had reached some given hour.

A cheese-maker should be capable of exercising his own judgment in the process of cheese-making, and if he is not capable of doing so, his place is on the outside of the cheese factory; or, as a certain dairyman puts it, it would be better for him to "study law."

During the latter part of August I was billed in my programme to visit St. Gabriel de Brandon for three days, but it was impossible for me to get away from that district in a shorter time than a week. I visited three factories in the parish and gave them two days in each factory, and every day my meetings were as largely attended as possible, some makers closing their factories for the day. I was requested to remain longer, but had to decline as my programme called me to the Sherbrooke Exhibition, where I assisted in a series of milk tests of the different herds of cattle that were in the competitions of the special milking test.

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After finishing at Sherbrooke, I proceeded to the town of Dunham, in Missisquoi County, to superintend a series of cheese-making experiments during the month of September and part of October. I made 273 boxes of cheese. Besides these, 24 boxes of experimental cheese were shipped to Ottawa. The records of the experimental cheese were sent to the Dairy Commissioner's office, Ottawa. The milk used for making this experimental cheese was selected according to the per cent of fat in the milk. It was intended to select three grades of milk, but it was found impossible to get a low grade at the Dunham factory. The per cent of butter-fat ranged from 3·6 per cent to 4·2 per cent. The experiment was carried on for six days from the 4th October to the 10th. There were many difficulties to contend with in the making of these cheese. One of the greatest of these was caused by the farmers feeding rotten potatoes to their milch cows. The potato crop in Dunham was a failure to a certain extent, but the crop did not fail to strike us in the cheese factory. It is difficult to detect the odours of rotten potatoes in cold milk, but it comes out with a vengeance when heated up. An investigation was made one morning to find out what the farmers were doing with their dairies. A large number of them admitted having fed their cattle rotten potatoes. The hogs would not eat them, so they fell to the cows, and they ate them readily.

Every farmer should pride himself in having the best milk aerator obtainable. For the very small sum of two dollars, a first-class machine can be had and it will do much good in one season, to say nothing of the reputation of the farmer who uses it.

### *The Babcock Tester.*

I was very much pleased with the Babcock milk tester in every way. Many experiments were tried by cheese-makers and others interested in milk testing by way of dosing the milk with water, skimming, adding cream to milk and various other ways to test its accuracy. In every case it was proven that it was a reliable test.

I also made experiments myself in testing sweet milk *vs.* sour milk and milk in advanced stages, and the test gave equal results in sour milk as in sweet or advanced milk, the only difficulty experienced with operating with sour milk, *i.e.*, thick milk, is getting it into the test bottle. One experiment where the milk was put into the test bottle and allowed to sour, brought about the same result as its duplicate which was kept sweet.

The machine is very easily operated: any one can do it successfully after a little practice. Great care must be taken in handling the sulphuric acid, and apart from that, practice will enable the operator to manage it with safety and correctness.

### *Experimental Dairy Stations.*

There are many places in the Province of Quebec that would be suitable for a dairy station, and there is not the least doubt that a station would be patronized by all who were within reasonable distance from the station. There are various reasons why a dairy station should be established.

It would open the eyes of the farmers from the very fact alone that it would be more money in their pockets, as the very best article possible would be manufactured.

The station would be kept in perfect condition, thereby setting the example to all cheese and butter-makers as to how their own factories should be kept.

It would develop and encourage dairy farming, more especially winter dairying, which the farmers of our Dominion must certainly work into, if they expect to realize a profit for their labour on the farm. Winter dairying cannot fail to pay if properly carried on, and besides the farm receives the benefit of the extra feeding.

Both cheese and butter-makers could visit the station and receive instructions in the best methods of making cheese and butter. Spring and autumn would be good times to visit the station and good instructions could be given in this way.



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The work of travelling instructors has gone a long way towards reaching the desired mark, but it is impossible to reach all makers in any one season.

I have had as many as eighteen makers at one meeting, and at the same time received notes from other makers expressing their regret at not being able to attend the meeting. So to meet the requirements of all concerned the station would be the most desirable.

The expense incurred through the experimental station would not be nearly so great as the expense of travelling instructors.

The only trouble I can conceive of in establishing an experimental station is that everybody will want it in their own district. There are numerous districts where corn is grown successfully, so there is nothing lacking to make the scheme prosperous and successful. The water supply in mostly every county in the province is, I may say, perfect. Springs and streams of pure water abound.

Wherever I went and talked with people interested in dairying and other pursuits of life, they were loud in praising the Dairy Commissioner's work, for what good instructions they had received from him from time to time.

I was greatly pleased with the beauty of the grand old province of Quebec. I enjoyed my travels through the province, especially while with Mr. Chapais, and I trust, as I have had both the pleasure of seeing and working, that my work has been satisfactory to all concerned.

I have the honour to be, Sir,
Your obedient servant,
C. C. MacDONALD.

## (4) Report of John Robertson (*for New Brunswick*).

To Prof. J. W. Robertson,
Dairy Commissioner, Ottawa.

Sir,—I have the honour to submit my report on dairy work for the season of 1891.

During the month of May, my work was in Western Ontario. On the 6th May, I met the other instructors in dairying at the Brownsville cheese factory, where we used the Babcock milk tester every day, and at the same time superintended the making of cheese, and some experimental work.

I visited four factories in Western Ontario, viz.: Thames, Avonbank, Geary's and Appin, where I gave instruction in cheese-making and carried on some experimental investigations.

These factories are all in very good working order. There is a want of uniformity in the quality of the cheese which might be avoided and the quality made more uniform in the individual factories, as well as in the aggregate. There is still a difference of opinion with makers on some points of the process which these experiments may help to explain.

### *Work in New Brunswick.*

I arrived at Fredericton on the 16th of June. I called on Mr. Julius L. Inches, Secretary of Agriculture for the province, from whom I received much valuable information, and to whom I am much indebted for kindness and readiness to assist and encourage the work in which I was engaged.

### *Agricultural capabilities of the Province.*

At first sight the agricultural capabilities of the province do not seem to be very great. Much of the country has a hilly, rocky appearance, and some parts have been rendered useless by being several times burned over with fires. There are other sections of the country of fairly good land, which if properly farmed could be greatly improved.

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The soil is mostly of a light, stony nature, some parts with good soil mixed with small stones which keep it open, other parts are springy and need under-draining. Some farms are very well cleared, especially in the counties of Carleton and Westmoreland.

In Carleton county the farmers have gone into dairying more than in any other county. Westmoreland has engaged more in raising beef cattle in the past. The system of farming that has been carried on in the past, has not been of such a nature as to improve the land; it has been the very reverse of that. The principal crops have been oats, potatoes and hay. They have been mostly sold and carried off the farms, which has reduced the productiveness of the soil in a far greater degree than if stock had been kept, and the produce of the land mostly consumed upon the farms. If the produce of cattle, sheep and swine had been made the channel of bringing in returns to the farmers, the land would be enriched and its productive powers increased by a liberal application of manure.

On the flats and islands of the St. John River there are fertile lands, which produce good crops of hay annually. In most instances the hay is shipped off, instead of being fed to cattle on the higher lands, which need to be fed in order to produce better crops or better pasture. As a farmer's stock and farm improves he himself improves.

The south-eastern part of the province contains some excellent land; in the districts of Sussex and Sackville there are fine opportunities for raising and keeping stock of the very best breeds, especially dairy stock. The natural conditions are adapted for dairy work, and the pasture is sound and sweet, with abundance of fine spring water. The soil is capable of growing large crops for cattle food, either for use in a green or in a preserved state.

The climate is also favourable for dairy work; the nights are cool and it is not unpleasantly warm during the day, with a fine atmosphere to breathe at all times, giving health and pleasure to man and beast.

It seems exceedingly strange that the province should pay out thousands of dollars every year for dairy produce, which could be produced within the province as cheaply and of as good quality as in the Province of Quebec, from which this province imports a very considerable quantity.

I have no doubt but in a few years this will be stopped, and instead of this province being an importer, it will become an extensive exporter, receiving thousands of dollars yearly from the exports of cheese and butter, instead of paying thousands of dollars to its neighbours for that which it can as well or better produce within its own borders.

*Cattle.*—The stocks of cattle are very much mixed. In some districts there are a few Durhams and some crosses of that breed. In some districts the Ayrshire breed has been introduced and seems to answer the purpose of improving the breed of cattle for dairy purposes very well. The Jersey breed has been introduced to some extent, but mostly about the towns as a family or butter cow. A few crosses are met with occasionally in country districts.

The Holsteins have been lately introduced to a considerable extent in the dairy districts, and are likely to succeed in improving the dairy herds of the province.

There are evidences to be seen here and there of farmers making progress in improving their herds; and although progress may be slow, yet, by a few setting the example and succeeding, others will be encouraged to follow, and the result will be as in other places, as a farmer improves his stock he improves his farm, his buildings, all his surroundings and himself.

*Sheep.*—In some districts numbers of sheep are kept by farmers on cleared land, but their number might be greatly increased, as some districts of the country are hilly and not so well adapted for cattle; but they would make, under proper management, splendid pasture lands for sheep.

*Dairying.*—The county of Carleton is the principal dairy county in the province. There are six cheese factories and one butter factory in the county. Jacksonville, owned by Mr. Jas. Good; Bellville, owned by Mr. JohnMartin; Waterville,



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owned by Messrs. C. L. Tilley & Son; Richmond Corner, owned by C. L. Tilley & Son; Avondale, owned by a company of farmers, and managed by Mr. Jas. A. Bartir; and Tracey Mills, owned by Mr. Jas. N. Sloat.

These factories received 27,500 lb. of milk daily, from which about 50 cheese were made. With a few exceptions, the milk was of good quality, the poorest sample gave 2·50 per cent of butter-fat and the highest 4·50 per cent of butter-fat, with an average of 3·69 per cent of butter-fat given by about 250 samples tested.

*Cheese.*—The quality of the cheese, all things considered, was very fair. The cheese were all made on the old American system of 20 years ago. The milk was set when it was taken in; no idea of ripening the milk before setting it, in cold weather, was entertained; the curd was stirred a while and then salted and put to press; no care was exercised to examine whether the curd was in a proper condition or not; the great thing seemed to be to get through with the work as quickly as possible. Consequently there was a want of uniformity in the cheese from the want of system in the making of it. Some days the cheese were very fair, other days they were too soft, weak in body, open in texture, or with flavour not good.

The makers were doing the best they knew, but had never received the instruction which they needed.

The makers are intelligent men and men who are interested in their work and as they own the factories in most cases, it is to their own interest as well as to that of patrons, that they should improve the quality, and increase the quantity of cheese which they manufacture.

The prospects are good for a very great increase in the dairy business of the province; arrangements have been made, or are proposed to be made during the winter, to build a number of cheese factories in the spring of the year. One new company is now chartered at Stanley, in the county of York, to erect and fit up buildings to make either butter or cheese, or both, as circumstances may require, with the prospect of milk from over 400 cows to start with.

A creamery was built and operated at Woodstock last season on the cream-gathering system. The buildings are good, and fitted up with improved machinery for making butter, a very fine quality of butter was made, but the farmers have not given it the patronage and support which was expected.

There is a small cheese factory at Andover, county of Victoria, but it has not been supported by the farmers as it should have been.

There is also a small factory at Sheffield, county of Sunbury, and one at Hampstead, county of Queen's. For some reason, these factories have not been supported by the farmers as they should have been.

There is a good factory at Havelock, King's county, built last spring with good prospect of doing a large business in the future. It is situated in a good dairy district of fine pasture land on limestone rock, with plenty of good spring water.

It is owned by Mr. J. E. Slipp, Sussex, and managed by Mr. R. T. McCready.

There is also a creamery at Sackville, where the milk is brought to the creamery and run through a separator, the farmers taking back the skimmed milk. It is situated in one of the best farming districts in the province. Many of the farmers some years ago went into stock-raising with beef cattle, but have rather gone back of late, as beef cattle were not paying them. I advised them to go more into dairying. The situation and conditions are unsurpassed for dairy cattle, being situated along the great marshes where large quantities of hay are grown, and where the high land is capable of growing fine crops and affording good pasture for dairy purposes.

On the 27th July I went over to Prince Edward Island, spent four weeks there, and returned to New Brunswick on the 22nd of August.

I visited all the cheese factories a second time: all the makers, except two, had adopted some of my suggestions; and in all these instances there was considerable improvement in character and quality of the cheese.

The change in the system of making led some of the makers to study the matter, work some experiments, and take notes of the results in a very intelligent way. They were beginning to see much to learn in connection with milk and its

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manufacture into cheese. It is difficult to get men to change from an old system with which they had been long accustomed to another system that is entirely new to them, and sometimes they do not get hold of the new system aright. In those cases the new system is rejected as a failure, when in fact it is the person that is the failure in failing to apprehend the system of improvement which has been set before him, and the last state of that person is worse than the first.

I spent September in making cheese, a few days at each of the factories, and in giving instructions and explanations of different points in the process of making, which were gladly received and appreciated by the cheese-makers.

Your instructions were for me to make cheese for export, in order to test the British market with cheese made in the province.

I visited the factories and made cheese a few days in each. I visited these factories afterwards to see how the cheese were curing. I expect a fair lot of cheese has been made for shipment.

*Meetings.*

I addressed fourteen public meetings of dairymen and farmers, at the following places: Havelock, Sackville, Fredericton, McKenzie Corner, Redbridge, Waterville, Centreville, Jacksonville, Millville, Kingsclear, Keswick, Stanley, Maugerville and Sheffield.

All the meetings, except two, were well attended; average attendance, about 150; at Stanley over 200 were present, and many questions of importance were asked and discussed at these meetings; occasionally a number of the ladies present took part and asked questions on points in butter-making.

Those present always expressed their thanks for the benefits derived, and the pleasure and interest which these meetings had given them.

One hundred and sixty cheese of August and September make were selected from the factories in Carleton county. One hundred and fifty-four boxes were shipped to Halifax for the English market, and six boxes were sent to the Experimental Farm, Ottawa, to be stored till spring, to find out the keeping qualities of cheese made in the province.

My work was something new to the dairymen and farmers of the province. They had no idea of the nature of the instructions given at our meetings till they attended them, took part in them, heard for themselves of the advantages of mixed and dairy farming, of the profits to be made from good stock when properly cared for, and how milk can be profitably produced and manufactured into cheese and butter. My work has awakened an interest among the farmers, and kindled a hope in many of the farmers of the province that in the near future there are possibilities within their reach of successful farming which hitherto were unknown to many of them.

In order to systematize the dairy work of the province, and to use to the best advantage the assistance given by the Dominion and Provincial Governments, I considered it essential that a provincial dairymen's association should be formed, and through the association the best means may be adopted of providing and disseminating information and instruction to the farmers of the province on the various branches of dairying.

I am glad to report that I have succeeded in receiving the names of over one hundred farmers and dairymen willing to become members of a provincial dairymen's association, which, it is to be hoped, will be organized at Fredericton early in the spring.

The farmers of the province have appreciated very highly the work of the Dominion Government in the Department of Agriculture, especially in dairy work, which they hope will be continued with increased usefulness to this province where so little has been done and so little is known of the true science of dairying.

I have the honour to be, Sir,

Your obedient servant,

JOHN ROBERTSON.

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## (5) Report of John Robertson (*for Prince Edward Island*).

To Prof. James W. Robertson,
Dairy Commissioner, Ottawa.

Sir,—I have the honour to present my report of work on Prince Edward Island. I arrived at Summerside, P.E.I., on the 27th of July, and travelled by rail to Charlottetown. I was very favourably impressed with the appearance of the country; the crops looked well where the land had been well farmed.

### *Agricultural Capabilities.*

A great part of the soil is a red sandy loam, and easily cultivated. It needs frequent manuring to improve and increase its productiveness. All the ordinary spring crops can be grown well under proper cultivation.

The greater part of the island is arable; a few parts are hilly, and parts on the north shore are sandy and uneven; but this waste land does not extend far from the shores.

*Crops.*—Spring wheat was an exceedingly fine crop, and farmers are beginning to sow more of it than in former years. Under proper management I do not see anything to hinder as much spring wheat being raised on the island as might supply all its own inhabitants with bread.

Oats were a very good crop. The great bulk of them are exported, but proper care has not been exercised in selecting the best seeds, and complaints are heard of farmers not cleaning their grain properly.

All kinds of root crops grow well when properly attended to. Potatoes are grown to a very great extent; the soil is well adapted for potato cultivation. Land that is so well adapted to grow potatoes would also grow good crops of corn, and corn can be grown cheaper than potatoes. A good crop of corn will produce more food for cattle than a crop of potatoes, and one of the best methods of restoring the fertility of the soil is by growing large quantities of food for cattle and keeping cattle on the farm to consume the feed.

### *Hay.*

Generally speaking, the land is well watered, and when it is seeded down in proper condition it gives good crops of hay, and affords rich pastures. In some districts there are good Shorthorns and grades of that breed; Ayrshires have been introduced to improve the dairy cattle. Holsteins have also been introduced, but until there is greater interest among farmers taken in dairy work there will not be much interest taken in improving dairy stock. The past experience of the farmers in dairy work has not been successful, but that was not because the conditions for dairy work were unfavourable. Neither in the land, nor the climate, nor the cattle is the cause of failure to be found; but partly in the way the business was conducted at the factories, partly because the farmers were not informed in the business, and partly in the absence of determination on the part of the patrons to make it a success.

These difficulties have been overcome by farmers in other provinces not so favourably situated for dairy work as Prince Edward Island is, and I see no reason why dairy work could not be made a success on the island as well as anywhere in the Dominion.

It does seem strange that people living on such a beautiful, fertile island, and having a summer climate scarcely equalled anywhere, should pay out thousands of dollars annually for bread and butter and cheese, when all these thousands could as well be saved by the farmers producing the bread and butter and cheese themselves. They might produce all they need of these commodities, and have some to export besides, which would bring in money from outside sources, instead of paying money to outsiders.

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*Dairy Work.*

There is only one factory in operation on the island, viz., Cornwall cheese factory, situated about eight miles south-west of Charlottetown, owned by a company of farmers and doing a very fair business, which is likely to increase very considerably in future. It is supported by 54 patrons, who supply about 6,000 pounds of milk daily and about 9,000 pounds on Mondays. I am glad to report that during the latter part of the season the quality and flavour of the cheese were very much improved.

The quality of the milk was very good on the average. The highest sample contained 4·25 per cent of butter-fat and the lowest 3·50 per cent of butter-fat. Several private dairies make a few cheese, but most farmers make butter of what spare milk they have. Very few farmers keep many milch cows, and consequently there is not much dairy work done on the island, which is to be regretted.

*Meetings.*

I addressed twelve meetings of farmers and their families in different districts, and I may say I never met with a more interested and intelligent class of farmers. The young people also seemed to be hungry for information about the farm, the crops and the cattle, as well as the dairy.

The meetings were held as follows: New Perth school, Vernon River Bridge hall, New Glasgow hall, St. Peter's Road hall, Cornwall school, Cavendish hall, North Milton hall, Park Corner hall, Summerside town hall, Crapaud hall, Kensington hall, Hamilton hall.

I am indebted to Mr. Arch. McNeill, secretary to the Provincial Government, for much valuable assistance given me in my work. I received help in arranging the meetings from the members of the Local Legislature and Legislative Council. By being present at them they set a worthy example to the farmers and their families of the island. I hope the dairy interests may prosper in their island home and that every other interest may share in the prosperity of the farmers.

I have the honour to be, Sir,

Your obedient servant,

JOHN ROBERTSON.

## (6) Report of S. L. Peters.

To Prof. James W. Robertson,

Dominion Dairy Commissioner, Ottawa.

Sir,—In forwarding you my report in connection with the work of the travelling dairy, for the month of December, 1891, I am glad to be in a position to say that your efforts in assisting our dairymen to improve their dairy products, by giving them an opportunity to witness practical illustrations in butter-making on the most approved lines, have been greatly appreciated. I may also add that the addresses on dairy topics in connection with the illustrations have been very welcome and have elicited much inquiry. I am agreeably surprised at the very deep interest manifested at all the meetings. The time appears opportune and the field ripe for labour. The local press have given quite extensive editorial notices of the work, while the correspondents have given as extensive reports of the meetings as could well be expected.

The press notices have brought many applications for more meetings. Fruits of our labours are already manifest in localities where meetings were held. The dash churn is being laid aside, the revolving churn will take its place, and the butter will be made as illustrated. Particular enquiries are being made about silos and their construction, with a view to building during the coming summer. A gentleman from King's county, on the eastern side of the river parish of Kars, came 16 miles on Saturday to see my silo and the ensilage, and insisted on my going to his parish to hold a meeting, which I arranged to do. While I anticipated good results, I am safe in saying they will be very much better than I anticipated.

I have been able to hold twenty-one meetings in all in the month.

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The following are the localities where meetings have been held:—

*King's County.*

| | Lb. of Butter made. | Attendance. |
|---|---|---|
| Oak Point | 5 | 54 |
| Belyea's Landing | 7 | 76 |
| Greenwich Hill | 3 | 41 |
| Neripis—No meeting. | | |

*Queen's County.*

| | | |
|---|---|---|
| Upper Otnabog | 7 | 48 |
| Queenstown | 5 | 45 |
| Upper Hampstead | 20 (2 illustrations) | 46 |
| Hibernia | 5 | 70 |
| Welsford | 4 | 43 |
| Armstrong's Corner | 3 | 40 |
| Olinville | 4 | 74 |
| Jerusalem, 10 a.m., 6.30 p.m | 4 | 47 |
| Summer Hill | 3 | 38 |
| Gagetown | 4 | 65 |
| Upper Gagetown | 3 | 54 |
| Hampstead | 7 | 67 |
| Mill Settlement | 3 | 35 |
| Lawfield | (no cream) | 29 |

*Sunbury County.*

| | | |
|---|---|---|
| Lower Berton | 4 | 65 |
| Berton Hill | 3 | 43 |
| Upper Berton...very stormy; meeting postponed. | | |

Whole number of meetings, 21. Pounds of butter made, 94. Total attendance at meetings, 980.

I returned home from Sunbury county on New Year's Day, as the roads were in so bad condition as to almost be impassable for a carriage, and so rough that people were prevented from going any distance to meetings. There are still six or seven localities in the county of Sunbury, on the west side of the river, in which it is desirable to hold meetings. This would complete in a very satisfactory manner our work on the west side of the three counties named.

I shall be pleased to carry out any additional work that you think best to be done.

I have done my travelling with my own horse and carriage, for which no charge is made.

I have the honour to be, Sir,
Your obedient servant,
S. L. PETERS.

QUEENSTOWN, N.B., 4th January, 1892.

## (7) REPORT OF J. W. WHEATON.

TORONTO, 26th December, 1891.

To Prof. JAS. W. ROBERTSON,
Dairy Commissioner, Ottawa.

SIR,—I respectfully submit the following report of my work in the province of Nova Scotia during the season of 1891.

The object of my work was to visit each of the cheese factories in the province, inspect the milk, give practical instruction to the makers in the best methods of handling and caring for the milk, so as to make a first class article of cheese, and to address meetings of farmers and others on dairy subjects. I gave particular atten-

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tion to the care of milk for cheese factories, the providing of proper food for cows, and the advantages that would accrue to the farmers by following an intelligent system of dairy farming.

I visited the twenty factories that were in operation during the summer, and made 716 tests of milk by means of the Babcock milk tester. These tests were made with a view not only of finding out who the honest patrons were, but more especially of getting some definite knowledge of the general quality of the milk throughout the province. A report of each test was left at the factory, together with a statement of the number of suspected samples. The cheese-maker, or committee of each factory, was recommended to visit each patron suspected, with a copy of the test, and warn them of the danger they incurred if such practices were continued. It was thought best not to prosecute at the beginning, as the patrons would be more watchful and careful when it was known that the milk had been inspected, and that the business was being looked after. Such proved to be the case, as my second visit to some of the factories showed considerable improvement in the quality of the milk. Nineteen meetings were held, mostly in connection with my visits to the factories, while later in the season a few were held in localities where new factories were likely to be started. The attendance was fairly good—an average of about twenty-five at each meeting. No special arrangements were made about advertising the meetings, word merely being sent to the manager of the factory, or some one else in the neighbourhood, asking that a meeting be arranged for. Many of these were arranged for the afternoon, when the farmers could not very well attend, and this may account for the small attendance at a few of the meetings. A keen interest was manifested in all that was said, especially in all relating to the growing of fodder corn and the better improvement of stock. There seemed to be a demand for further information on all matters relating to dairy farming and to farming in general among the people. In many places a larger attendance was promised in the future, if meetings were held, while requests were received for meetings in several localities where factories are not in operation, which I was unable to overtake before leaving the province.

Dairying in Nova Scotia is still in its infancy. Factories were started in a number of localities in the western districts some fifteen or twenty years ago. These in a few years were compelled to shut down, excepting three that were in operation in Annapolis county last season. Their failure was due, to a great extent, to the purchase of the milk at too high price by the manufacturer, who, not being able to realize a remunerative price for his cheese, was compelled to close up his business after finding his finances in a worse condition than when he began the business. The bulk of the Nova Scotia cheese is now made in the eastern districts, principally in Antigonish County, where there are eleven factories, and Cape Breton, where there are four. These factories are run on the co-operative system, the cheese being sold at the highest market price when ready for shipping, and the price realized, after deducting the manufacturers' charge for making, going to the patrons. The price paid to the patrons last season ranged from seventy to seventy-five cents per 100 pounds of milk. No cheese was shipped out of the province last season, excepting one or two small lots that were sent to Newfoundland, Prince Edward Island and Jamaica. In fact, the demand in the local markets in the fall was greater than could be supplied by the factories then in operation in the province. The quantity of cheese manufactured in a number of the factories last season was less than formerly. This may be accounted for in this way: When these co-operative factories were organized four years ago the patrons signed an agreement by which they bound themselves to supply the milk of a certain number of cows for a period of three years. This agreement having expired, in a good many cases, the year previous to my going to the province, the people, feeling that they were no longer bound to supply milk, began to assert their independence and withdraw their support. I made personal and definite inquiries on this point in all the places that I visited, and in only one or two instances did I find any one who was not convinced that the cheese factory paid well. The great difficulty, I was told, was in conveying the milk to the factory.

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The plan now in operation is for each farmer to draw his own milk to the factory; this, in a great many cases, necessitated a drive of five or six miles every morning with from 75 to 100 pounds of milk. Those farmers who lived some distance away, finding that it did not pay to go so far every morning with a small quantity of milk, quit sending as soon as they were released from their agreement. This is a serious difficulty and will have to be provided for, if the cheese business in Nova Scotia is going to be as successful as it ought to be. It would not have occurred if permanent milk routes had been established when the factories were first organized. These are much harder to establish now, as those farmers living near the factory, having become accustomed to it, prefer to draw their own milk, while those some distance away are not willing to do so, and unless both parties unite, enough milk cannot be secured on the various routes to make it worth while for one man to devote his time to collecting it. The amount of milk received at each factory ranges from one to three tons per day. They commence operations about the 1st of June and close about the end of September, thus making a very short season of four months. This is too short a time for the farmer to make all the profit out of his cows that he should. The cows, as a rule, calve in May and are put dry about the end of October or middle of November, thereby making it extremely difficult for a cow to give enough milk during the milking season to pay for her keep during the whole year. The farmers in many instances do not appreciate the benefits derived from the cheese-factory as much as they should. Many of them look upon it with suspicion, supposing that the manufacturer gets all the profits and that they are putting him under great obligations to them, by supplying milk to his factory. There seems to be a general want of that sympathy and co-operation between manufacturer and patron that is necessary to make the business a permanent success. This can be remedied, to a great extent, by bringing before the people the methods and means of operating factories in other places, for example those of Ontario. Those difficulties mentioned above are not so noticeable through Cape Breton, where the factories were in operation for the first season in '91. I was able, I think, by bringing before the people there the methods adopted in other places, to infuse more confidence in the business among the farmers, and to lead them to co-operate more with the manufacturer in making their factory a paying concern. All the factories in Cape Breton and the majority of those in Nova Scotia are owned and operated by private individuals; only six being controlled by joint stock companies of farmers. As far as my observation goes, I think that a number of factories controlled by one person is the best way of carrying on the business until the amount of cheese produced is sufficient to warrant the establishing of local cheese markets similar to those in Ontario. It would be better if the farmers owned the buildings and plant, as they would then have a personal interest in the concern. However, in new localities, where I attended meetings in the fall, the farmers did not care to invest money in the business themselves, and preferred to have some capitalist assume the responsibility and control.

There will probably be two or three new factories in operation in Cape Breton and a few more in Nova Scotia next season.

There were no creameries in operation last season in Nova Scotia. Considerable butter was made by the farmers themselves, who in a few localities where they made a business of it, turned out some of pretty good quality; but generally the butter made throughout the province is of a very inferior kind. This butter is bartered for trade at the country grocery, excepting a few cases that came under my notice where the farmer shipped it at his own risk. There is great need of practical information and instructions before the butter produced in Nova Scotia has attained to that excellence and perfection which should be the aim of every good butter-maker. An experimental creamery, operated during the fall and winter so as to show the farmer how profitable the business can be, would do invaluable service in developing and improving the butter industry of Nova Scotia.

The country generally is naturally adapted for all kinds of dairy farming. The soil is somewhat loamy, and if properly cultivated and fertilized, is capable of producing good succulent grasses suitable for the production of good, pure milk. The

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area devoted to pasturage is quite large, especially in the eastern districts, the higher lands and hill slopes furnishing lots of grass during the early season, while the lowlands and intervales come in well for the drier season. There is an abundant supply of pure, fresh water; nearly every farmer having a spring or spring water running through or near his farm. The climate generally is favourable for dairying; the nights are cool and the sea breezes prevent the frequent occurrence of that muggy, close weather, which makes the preserving of milk in a pure condition a difficult matter. The cold, wet weather during May in the eastern districts is a serious hindrance to the dairy business, as it keeps the pastures back and necessitates feeding the cows till the season is well advanced. In cases where winter's feed is scarce and shelter is poor the cows suffer considerably during the early spring, and are rendered unfit for supplying milk during the summer. The winters are long, and cattle have to be fed in stables seven and, in a number of places, eight months of the year. Frequently, where the shelter is insufficient and the proper food is not provided, the cows come out in the spring in a very poor condition, unfit for supplying good milk and lots of it, and requiring all the extra food derived from the pastures to build up the constitution to withstand the coming winter. However, in several localities, good stabling and good food, such as fodder corn, &c., have been provided by a few farmers, who are making dairy farming pay; thereby proving that the difficulties mentioned above may be overcome by a little care and forethought. The quantity of milk given per cow on an average is not as large as it might be. Still in several places in Cape Breton and in the Antigonish and Annapolis districts cows were found that were giving as much milk per day as some of the best Ontario cows. These instances, however, are rare in the districts that I visited, and 15 lb. per day per cow is about the general run. At one factory a farmer sent all the milk from twenty cows to the factory, and his pass-book showed only about 200 lb. per day. This condition of things is due altogether to improper selection of cows, poor feeding, poor care, and continually breeding from scrubby stock and poor milking strains. There is need of much information and education of the farmer along these lines.

The cattle, as a rule, are small. In the western districts, through the Annapolis valley and along the Stewiacke River, some good-sized steers were seen that would be large enough for shipment to the English markets; but generally through the eastern portion and through Cape Breton the stock cattle are small and somewhat inferior. All the beef cattle of the eastern districts are shipped to Newfoundland, where inferior kinds are easily disposed of, thereby giving the farmers no incentive to improve their herds. The cows, therefore, in many places, are small and very inferior, and the bulls used are mostly of the scrubby kind. However, there is quite a sprinkling of improved stock in many localities, such as Truro, Antigonish, River John, Whycocomah, Mabou, &c., principally Ayrshires, Jerseys, Durhams and a few Holsteins. The general run of the stock in Nova Scotia needs to be considerably improved before the farmers are in possession of good profitable beef-producing and milk-producing herds of cattle.

All kinds of crops grow very rapidly when the growing season begins. Hay is the staple crop, and large areas of it are grown. The yield per acre, on the whole, is small, as in many of the meadows in the higher lands that have been cut continuously for a period of 30 or 40 years, without being broken up or nourished in any way, the timothy and clover have died out, leaving only a very spindly growth of inferior native grasses, mixed sometimes with all kinds of weeds. These on an average do not yield one ton per acre, and many fields that I saw would not pay for the cutting. The intervales and lower lands of Cape Breton, Antigonish, Pictou, Cumberland and Annapolis counties, and also the Tantramar marshes, and those of the Minas Basin, generally yield an abundance of superior hay if well looked after.

Oats have been grown very extensively in many localities, especially in the east. Of late the amount of oats sown has not been so large, as they have not yielded as well as formerly, due mostly to the lack of change of seed and to the gradual decreasing in the fertility of the soil in many places.

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No fall wheat is sown, as the winters are very unfavourable for it. Very little spring wheat or pease, and not very large quantities of barley, are sown. All spring grains would grow well if the ground were properly worked and put in condition for them.

A great many roots, chiefly turnips, are grown for feeding cattle through the Annapolis valley and in Cumberland and Colchester counties. Through Cape Breton and eastern Nova Scotia only occasional fields of roots were seen, but these showed clearly enough that roots of all kinds could be grown very profitably if given the proper care.

Fodder corn is very little grown. A few of the farmers in different localities have tried it, but not knowing the plant very well, and being ignorant of how to care for it for winter's use, they have given up growing it. From inquiries made in regard to it and from what I observed myself, I think fodder corn can be grown very profitably. Care, judgment and a little work only are needed to make it a success. The climate, perhaps, may not be as favourable for its growth as some parts of Ontario, and the frosts may come earlier in the fall; still, if good judgment is used in selecting and preparing the ground and the plant is given every chance during the summer by cultivating and loosening the soil around it, I think it will be sufficiently developed before the time for cutting. Though it may not reach the glazed stage, in many places, before the frosts come, still it will be near enough to it to make a very valuable food for winter. Last season was rather unfavourable for corn-growing, as there was considerable cold, wet weather. However, some fine fields of corn were seen near Lawrencetown, Annapolis County, Antigonish town and Lochaber, Antigonish County, and Mabou, C.B. A large number of the farmers are prejudiced against corn growing, as they think it will not mature and cannot be preserved for winter's use without great expense. At the meetings I was enabled to give them practical information, which will, I think, have a tendency to dispel their prejudices and induce many of them to try it next season. The samples of corn that you sent down for distribution were given out pretty widely to the farmers in the Antigonish district, together with your printed directions for planting, &c. They came a little late and therefore were not planted soon enough to give them a chance to show the best that could be done; still, I had some very favourable reports from a number of them before I left the province. There are not many silos in use, but those that are, as a rule, give good satisfaction. The further development of the dairy industry in Nova Scotia will depend, to a great extent, upon the general adoption of corn growing as food for cows, as the fodder now in use is too expensive and not suitable for producing milk during the winter.

The cheese factories are generally well situated, usually on the bank of some stream, and in the majority of cases with spring water running into the building. The buildings are good, excepting three in the Annapolis district that have been built for a number of years and are somewhat in need of repairs; and two in Antigonish county that have been built with a view to cheapness and not to utility. With these exceptions the buildings are new and well finished, and reflect credit upon the owners. In many cases they are painted, and present a tidy, attractive appearance from the outside. The equipment is good. All the improvements in machinery, &c., are to be found in nearly all the factories built within the last five years. No engines are in use, the curds being ground by hand; and in several small factories self-heating vats are used instead of boilers. As regards cleanliness, there is some room for improvement, especially in connection with the curing-rooms. In many cases the air of the curing-room was very impure and unfit for curing cheese properly. I think many of the makers did not realize the importance of having the cheese cured in a room perfectly sweet and clean. The making-rooms are kept in fairly good condition, yet in a few of them the nooks and corners are sadly neglected, thus showing that the habits of cleanliness on the part of some of the makers are not of a very high order. In many sections the roads are not conveniently arranged for laying out permanent milk routes, as they run along both sides of the rivers, thereby making it necessary to have two milk waggons where

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otherwise one would be all that is needed. However, the roads are never in a very bad state during the cheese season, and the almost impassable condition of roads, as seen in some parts of Ontario, is rarely met with in Nova Scotia.

The tests for butter-fat made by the Babcock milk tester from samples of milk taken from the vat in each of the factories I visited showed amounts ranging from 2·9 per cent to 3·8 per cent, or an average of 3·32 per cent for each factory. This is a rather low average, and is due, to a great extent, to the improper selection of cows, poor care and feeding during the winter, the want of salting the cows, and perhaps some of the milk being tampered with by the patrons. As regards the last, many of the people are given to keeping the strippings or removing the cream, partly, I think, through ignorance of the consequences. I heard of one man who had a herd of six cows and agreed to send three cows' milk to the factory; his plan was to take the first half of the milking from each of the six cows and send it to the factory and to keep the last half at home. Of course this was not done through ignorance. In many places, however, good samples of milk were met with, showing 4 and 4·5 per cent of fat. In the Margaree district I met with a sample that showed 5·3 per cent of fat.

I would recommend more thorough airing of the milk before cooling, more cleanliness in milking, and in caring for the milking utensils. The cows should be salted regularly. It has been the general custom not to give the cows salt at all, to which fact, to some extent, may be due the small quantity of the milk given per cow, the comparatively poor quality of the milk and some of the peculiar flavours to be found in the cheese. Both the Cheddar and American fine-cut systems are used in making the cheese. The latter system is followed altogether by the makers in the Annapolis district. Here the cheese were generally soft and moist, with a sour whey flavour, and where the curds had been stirred drier, the cheese in many cases were open and porous or hard and bitter. The cheese made by the Cheddar system, which is in use altogether in the eastern districts, were more even and firmer in body, but in a few places there was a tendency on the part of the maker to leave too much moisture in the curds, with a view to lessening the average number of pounds of milk required to make a pound of cheese. The cheese in many factories were weak in body, and loosely put together. The flavour, as a rule, was not very clean, and only in exceptional cases were cheese of very fine creamy flavour met with. However, considering the inexperience of many of the makers and the newness of the business, much credit is due the promoters of the cheese industry in Nova Scotia for the comparatively high standard already attained in the quality of their cheese. I think my instructions to the makers, and the help I was able to give them during my visits, have been beneficial, as on my second visit to some of the factories a decided improvement was noticed in the quality of the cheese produced. I would recommend more thorough ripening of the milk in the factory before setting, firmer cooking of the curds and more stirring before matting, so as to secure a firmer bodied and better flavoured cheese. If more care is given on the part of the patrons and makers, there will be no difficulty in making as good cheese in Nova Scotia as in any part of Ontario.

At your recommendation I made 100 boxes of cheese in the best way possible for shipment to England as samples of Nova Scotia cheese. It was thought that the best results would be attained by making them at one factory under similar conditions, and therefore Mr. L. C. Archibald's factory, in the town of Antigonish, was selected as one well situated and adapted for the purpose. We had the warmest weather of the season while making these cheese, thus rendering it difficult to keep the milk sweet and pure and to control the temperature of the curing-room. The milk in the vat showed 3·4 per cent of butter-fat, and later on 3·5 per cent. I ripened the milk sufficiently to cause the curd to be ready for cutting in from twenty to thirty minutes after setting. The curds were cooked pretty well, and were well stirred before matting. After they were matted they were piled over three or four times before grinding. I allowed the curds to mellow and ripen until the pure creamery flavour had been developed and the whey had been well separated

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before salting. I was able to turn out some fine cheese, firm and even in body, pure in flavour and medium in colour; and I hope they will answer the purpose, and will be able to accomplish the object you have in view of establishing a market in Great Britain for Nova Scotia cheese.

In respect to the project of running a creamery in the fall, for a short time after the factories close, in order to show the farmers how profitable a business winter dairying would be, I might say that as the season advanced it became more and more evident that sufficient milk could not be secured to make it worth while putting in machinery and operating it last season; nevertheless, I think the scheme a good one, which can be carried out in the near future, if the people prepare themselves for it.

The past season has been a very pleasant one to me, and I hope I have accomplished something in the way of promoting the dairy industry in Nova Scotia. I was well received by every one, and I can recall no instance in which I did not meet with the co-operation and sympathy of the makers and owners of the factories visited. I have to thank the managers of the different factories and other gentlemen in the localities that I visited, for the trouble they have taken in announcing and arranging for meetings and for their assistance and kindness in making my visits as pleasant as possible.

All of which is respectfully submitted.

Your obedient servant,

J. W. WHEATON.

## (8) Report of J. B. McEwan.

Ottawa, January, 1892.

Prof. Jas. W. Robertson,
Dominion Dairy Commissioner, Ottawa.

Sir,—At your request I submit to you the following report of the work accomplished by me under your supervision from 3rd May, 1891, to the end of the year.

My appointment dated from 3rd May, 1891, and acting on instructions received from you then, I visited the Brownsville cheese factory, and in company with other members of your staff, spent two weeks there, carrying on a series of experiments in milk-testing and cheese-making.

Arrangements having been made to visit a number of factories in different parts of the Belleville section, with the object of giving instructions in the most approved methods of testing milk and manufacturing cheese of fancy quality, I arrived at Belleville on the 17th of May, remaining in that section until 5th June. I visited a central factory in each locality, nine factories in all, usually spending two days at each, one day being given to cheese-making and milk-testing with the Dr. Babcock milk-tester for butter-fat, and Quevenne's lactometer for specific gravity, and the other day for which a meeting of the patrons had been called, being devoted almost entirely to milk-testing, and the time occupied by the meeting.

The interest manifested in these visits was most encouraging, a large number of cheese-makers in each section spending a day at the factory visited. The exchange of ideas and comparisons of different methods practised was necessarily productive of good, and the meetings were attended in large numbers by the patrons and those interested in the advancement of dairying.

The scheme of winter dairying as advocated at these meetings, the lessening of the cost of production by the growing of fodder corn for ensilage, the careful breeding of cows for general purpose dairying, the simplicity and apparent reliability of the Babcock milk tester, and the payment for milk according to its butter-fat, were heartily concurred in by those present, and the opinion freely expressed that dairying followed out intelligently under these conditions could have but one result, and that a great improvement in the financial condition of the farmer and a preservation and building up of the resources of the soil. The payment for milk according

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to its quality would put a discount on dishonesty, in the watering and skimming of milk, and would be an inducement to breed for quality of milk, not quantity only, as at present, therefore ensuring a better quality of dairy products.

*Adaptability of this Section for Dairying.*

This section has all the natural resources for profitable and successful dairying. There are belts of land on which wheat-growing is extensively carried on, but they have suffered, as nearly all such lands have in Ontario, by being outcropped, and the farmers are realizing that they cannot profitably compete with newer countries in the growing of wheat. Especially is the Madoc section adapted for dairying. This country is more or less rocky, and therefore not so well suited for grain-growing, and the supply of pure spring water is invaluable. The Peterboro' section is also naturally blessed with an abundance of good water. This boon of a never-failing supply of good water cannot be over-estimated, as it contributes so largely to the supplying of good milk to the factories.

*Cows.*

I found in nearly every section that the careful selection of cows for dairying purposes is very much neglected, and in a great many cases there are too many kept for the amount of feed supplied, with the results that the profits on a number of cows in a herd are eaten up, in the losses sustained, by possibly a larger number of poor ones.

*Cheese Factories.*

The condition of the cheese factories is a matter that was very forcibly impressed on my attention, and with a few exceptions there is urgent necessity for a great improvement in buildings and modern conveniences for the manufacture of cheese to give the best results. Even some of the buildings recently erected are far from being models, and owing to the plan of construction, necessitate a large amount of extra labour. Some of the older buildings are most dilapidated; the value of the whole plant would not exceed four or five hundred dollars, and still the cheese-makers are bound by contract to turn out a first-class quality, although the cheese in hot weather pass through a temperature of eighty and ninety degrees Fahr., owing to the faulty construction of the curing-rooms.

The inspectors of the Eastern Dairymen's Association are doing a good work, but under the present system of visiting individual factories, with such a large territory to cover, progress in their work is necessarily slow.

The making of cheese from directions laid down by "hand-books on cheese-making" should be discouraged, as they are in a great many cases productive of no good, and often contrary to the most approved methods. In some cases I found them being used in preference to hints given by an undisputed authority, based on the results of a wide range of experience and close observations. Some of these "books" undertake to lay down a "rule of thumb" for making cheese, and any person acquainted with the process of cheese-making will admit that to be successful in the manufacture of a first-class article at all times, under every varying changes of the weather and conditions of the milk, the maker must trust to his judgment and the more intelligence displayed the greater success. In my opinion any books published on cheese-making should come under the same system as the text books in our public schools, and be authorized by the proper authorities.

At this season, when new cheese were in demand, and every week meant a decline in the market, there appeared to be a misunderstanding between the cheese-maker and salesman on the matter of immediate sale and shipment of May cheese, which meant a loss to the patrons. The cheese-maker not having any understanding as to ready sales being made, naturally made the cheese to cure slowly to protect himself, and when the weekly sale was made, including cheese to within a few days of the hoops, the cheese would be objected to by the buyer for not being cured

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enough for shipping, and the cheese had to go into the following week's sale at a reduced figure. In some factories I found the cheese being made to stand a temperature of eighty degrees, and the temperature of the curing-room was kept at about fifty-five.

The quality of the milk delivered at the several factories was very good. Taking samples of all the milk, I found it in nearly all cases to contain 3·4 per cent of butter-fat, varying from 2·6 per cent the lowest, to 3·6 per cent the highest. In some samples there was strong evidence of the milk having been adulterated. The condition of the milk was fairly good, and the use of aerators, at present rather limited, is being strongly advocated by those who have tried them and found them almost indispensable for the proper care of milk.

The quality of the cheese was very good, and a few of the factories had the best bodied May cheese I ever saw. The prevailing method of cheddaring in the vat apparently gives very good results in cool weather; but in hot weather, when the acid develops so quickly that the curd cannot be cooked properly, it is almost impossible to get the curd dry enough after dipping. By having a set of slats for the vat this could be avoided.

Viewing the cheese industry in this section from a business stand-point, there is room for improvement. The executive of each factory should insist on the sale of their cheese and delivery thereof being carried out on straight business principles, the inspection of the cheese at the factories, testing of weights and payment arranged for on delivery at station or warehouse.

The prevailing tendency to reduce cheese-makers' salaries is to be deplored, as it tends to make the best men careless, and will prevent the class of men that we are desirous to see enter the business from doing so, knowing the small wages paid for skilled labour and the heavy responsibility assumed.

Finishing this trip on 5th June, I immediately reported at the Central Experimental Farm, and from that date until 10th July I spent in the Experimental Dairy.

Arrangements having been made to visit Manitoba and the Territories, I left on 10th July for Brandon, and in company with you and Mr. Whitley spent the next four days there—at which time the Brandon summer fair was being held—gathering information on the location of creameries and cheese factories, and procuring the names and addresses of those most interested in dairying, in all parts of the country which we intended visiting.

It was during these few days spent in the live and thriving town of Brandon, situated in the greatest wheat-growing country in the world, that I began to form a faint conception of the vast resources of this wonderful country. The exhibits of agricultural products, considering that the fair was being held in mid-summer, were excellent. The entries in the live stock classes were numerous and the competition for honours keen. When you came to the display of farm machinery you realized that it was a grain-growing country indeed, and already the representatives of the different firms appeared to anticipate the bountiful harvest that was to come.

The convention of the Manitoba Dairymen's Association was also held at this time, and although this association is in its infancy and its membership roll small, under the management of energetic officers it will soon occupy the same position towards the dairymen of that province that its sister organizations in Ontario do to Ontario dairymen and dairy interests.

From this time until the end of October I visited fifteen cheese factories and seven creameries, and held meetings at twenty places in Manitoba and the Territories, covering the main line of the Canadian Pacific Railway from Elkhorn west to Regina, the Northern Pacific, Portage la Prairie branch, the Manitoba and South-Western, the Emerson branch of the Canadian Pacific Railway, the Northern Pacific from Winnipeg to Emerson, the Red River, and Springfield and Stonewall sections.

I also spent two weeks during September at Manitou cheese factory, making cheese for export, as a demonstration of the quality of cheese Manitoba is capable of turning out.

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I spent a week at the Winnipeg industrial exhibition, and, together with Mr. Whitley, acted as judge on butter and cheese. The exhibition was a grand success as regards exhibits, but owing to wet weather during the last days the gate receipts were considerably lessened. The large and splendid exhibit of butter and cheese, especially of butter, was beyond expectation. In butter the quality—with some exceptions, of course—in all classes was very fine, and the prize winners represented nearly every locality where butter-making is carried on extensively. In cheese the quality did not represent as high a degree of excellence as the butter; but, considering everything, it was very good.

The object of my visits to the cheese factories and creameries was the giving instructions on the most improved methods of making butter and cheese and testing milk, gathering of information on the condition of dairying, and the quality of dairy products manufactured. At the meetings held I gave a practical demonstration of butter-making and a talk on some branch of dairying, particularly on butter and the advantages of mixed farming. The interest manifested in these meetings and the large attendance, considering the season, when nearly every person was extremely busy, was beyond expectation.

At the cheese factories and creameries my visits were received with a lively interest, and every person seemed eager to gain information. The testing of milk with the Babcock and lactometer was a wonder to some and a revelation to the majority.

I found that in the localities where farmers' institutes existed the meetings were most successful from the point of numbers and enthusiasm, which is one of the many proofs of the great benefits farmers receive by clubbing together. In one community, where the organization has taken the form of a farmers' club, there was said to be a clear saving to the members for last harvest's binding twine of $900. In some places, where institutes had only recently been organized, they had a membership ranging from one hundred to one hundred and twenty, which means a large number when you come to consider the sparse population. It is most unaccountable that the farmers are so slow in taking up with co operative dairying, and in my trip I encountered several "monuments." in the form of idle factories and creameries, caused by not holding together. These meetings were also well patronized by the ladies, and frequently they were in the majority. Sometimes they invited the keenest discussion, when the exhibition of butter-making was going on.

The advantages of carrying on mixed farming profitably are numerous, and the benefits to be derived by the extension of dairy lines of agriculture cannot be overrated. The faults in the present system of farming which suggest themselves to me are, that nearly every farmer attempts to grow too much wheat. This sowing of a large acreage may be excusable, on the ground that if properly harvested, and not damaged by the elements, the return is very large, but the wisdom of it is very doubtful, judging from past results. The one great desire of the farmer is to have his wheat ripen early, and day by day, as the season of the year approaches when frost may be expected, the anxiety increases, and only those who are deeply interested can fully understand the deep concern and the murmur of low voices of men gathered around a thermometer at 2 or 3 a.m. on a cold night, when frost is feared. When harvest is in full swing, the question of securing enough help is often a serious one. The time is very limited for the harvesting of large areas of grain, threshing, marketing and ploughing, specially so if the weather happens to be unfavourable.

It appears to me that under existing conditions—even if the farmers do not wish to fortify themselves by adopting mixed farming—that to cultivate a smaller acreage, to have the ground thoroughly prepared in the fall, so as to ensure early seeding in the spring, the careful selection of seeds that will give the best results as to early ripening and market value, would enable the farmer to cut his grain before there was much risk of frost, and finish threshing and ploughing before winter sets in.



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It may be some time before districts such as Portage la Prairie, Carberry, Brandon, Virden, Souris and Wawanesa take up dairying to any great extent, as these districts are particularly well adapted for wheat growing, and the natural inclination of the people appears to be towards that line of agriculture. Other sections, where wheat growing is carried on just as successfully, are also well adapted for mixed farming, and the necessity as well as the profitableness of developing the dairy industry are recognized.

I am very much impressed with the prospects and natural advantages which the different sections visited possess for the manufacture of the best quality of butter and cheese. The abundance of cheap pasture, the natural richness of the milk, usually the most favourable weather—warm days and cool nights, which should mean the delivery of the milk in fine condition—are all favourable to the production of good quality, and under careful, competent management, and the employment of skilled labour, success is assured.

*Cows.*

My first impression, formed of the cows as I saw them from the car windows, and passing them when driving over the prairie, was not a favourable one. A great many of them were large, uncouth-looking animals; but as I became better acquainted with their value for beefing and dairying purposes, and the exceeding richness of their milk, my opinion changed to wholesome respect. Throughout the Red River section there is a great variety of common-bred cattle; but in other sections there were animals of decidedly better appearance. I saw some fine herds of Ayrshires, Shorthorns and grades. In conversation with drovers they were very positive in their statements that these grades were superior to similar-bred cattle in Ontario in point of quality and value. There has been little effort put forth in the breeding of Jerseys, as the general impression is that with the somewhat scant stable accommodation the climate would be too severe in winter. The greatest drawback existing at the present time in the raising of live stock is experienced in wintering them. Fine bank barns and comfortable stables, such as those of Ontario, are as yet few in most sections, the cost of building material being high and beyond the limited means of the majority. It is possible, with the limited means at hand and at no great trouble or expense, to make most comfortable stables, especially when straw is so plentiful.

*Pasture.*

The large extent of unoccupied lands in the majority of places provides an abundance of pasture. In the more thickly-populated portions, where the land is all taken up and the farmers are compelled to pasture within their own limits, they find themselves forced to make provision for pasture by sowing grasses. This has been tried with varied results, and there appears to be a great diversity of opinion as to the ultimate success of the experiment, some having good results and others declaring it a failure. Experiments carried on at the Brandon and Indian Head experimental farms go to show that there are several varieties of native grasses that can be successfully and profitably grown. The best mixtures of different seeds to give the best results as yet have not been fully determined, but experiments towards the establishment of these points are being carried on. The number of places where this question is a live issue are at present few indeed, and the unlimited amount of natural pastures is the greatest inducement to the keeping of live stock. Last summer was most favourable for pasture. Owing to the unusual amount of rain at all times, the ground never became parched or the pastures burned up, as sometimes happens during a dry summer. The latter danger can easily be guarded against by the sowing of mixed crops for green feed, which give an enormous yield per acre.

Almost the only cost at present for the whole summer's feed is the expense of keeping a herd boy.

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The supply of hay on the marshes or sloughs affords opportunity for providing good feed for the winter months, the cost being very small. The hay is usually cut and stacked during the summer months, and hauled home in the winter as it is required. In some districts, where farmers are compelled to go a great distance to cut hay, it would be much better to sow mixed grains, such as oats and barley, or oats, barley and vetches, to be cut when green and cured the same as hay. The yield per acre is very large, for under favourable conditions it has averaged between four and five tons per acre.

*Water.*

In a number of places visited the scarcity of good water is a drawback. In the Red River district, where there are ten cheese factories and three creameries, the country is watered chiefly by the Red, Seine and Rat rivers, and they are muddy streams. I found a decided improvement in the water in the Steinbach and Greenfelt sections. At some places there were flowing wells.

Along the western side of the Red River, at a great many places the supply of water is limited, but is apparently of a very good quality. The importance of a large supply of good water for cows where dairying is carried on is often overlooked, but when it is considered that nearly 87 per cent of milk is water, the necessity for cows not being allowed to drink anything impure is readily recognized.

*Creameries.*

I was very much surprised to find the creameries so well equipped and turning out such a fine quality of butter. Of the seven creameries visited, five were being run on the centrifugal-separator system, and two on the cream-gathering system. The one difficulty in operating a creamery on the separator plan is the distance the milk has to be drawn, owing to the sparse population. The creameries run on this system are situated in fairly well-settled districts, the greatest distance that milk is delivered from being about six miles. They are all owned and managed, with one exception, by private individuals, the patrons delivering their own milk and taking home 80 per cent of the amount delivered in skim-milk. The mode of payment varies. In some cases the milk is purchased at from 65 cents in the spring to 80 cents in the fall per 100 pounds of milk delivered. Others charge 5 cents per pound of butter manufactured. At one creamery, during the season of 1890, the patrons realized 77 cents per 100 pounds of milk delivered.

The creameries are all doing good work, and should receive the hearty support of the farmers in their several districts. The creameries being run on the cream-gathering system, are situated in less thickly settled localities, and in gathering cream a distance of about twenty miles is covered. The difficulty experienced in this system is the varied conditions of the cream when delivered at the creamery in warm weather, when very little care has been taken to keep the cream pure and sweet. The butter-makers complain, and rightly, that it is impossible to make fine butter under these existing evils. The free use of ice, by keeping the cream in ice-water until collected, would remedy this entirely, and the expense of storing a sufficient quantity of ice during the winter would be very small. The Fort Qu'Appelle creamery is a joint stock association, but owing to the apathy of the farmers and in spite of the efforts of the promoters to have the farmers buy a sufficient amount of stock to have the controlling interest, only 10 per cent is held by them. The creameries are all of modern structure and equipped with the latest improved machinery and appliances. When visiting St. Eustache I was somewhat surprised to find a "Babcock" milk-tester in use, testing the skim-milk and buttermilk, to see that they were getting the best possible returns from the separator and churn, and also testing the milk as sent in by the patrons.

This keen interest manifested by the creamery men augurs well for the future, and they are fully alive to the necessity of always turning out a first-class article, allowing no loss in any part of the business.

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The splendid averages are also very encouraging, and it almost appears that this line of dairying at the present time is the most advantageous. The quality of the milk is very rich, especially when considering the breed of cows. The amount of milk received daily at the centrifugal-separator creameries varies from 3,000 lb. to 8,000 lb. per day, and the amount of butter made daily at the cream-gathering creameries from 100 lb. to 200 lb. The percentage of butter-fat contained in the milk delivered at the different creameries ranged from 3·8 per cent to 4·8 per cent, and in one case a sample of milk taken—being the milk of a herd of grades—contained 6·6 per cent of butter-fat. The average number of pounds of milk to make a pound of butter is from 24 lb. in the early spring months to 18 lb. in October. The best of results were being obtained in the separating and churning process, the skim-milk showing two-tenths of one per cent of butter-fat, and the buttermilk showing only a trace.

Nearly all the butter is shipped direct from the creameries to British Columbia, as there is a demand there for a first-class article. The prices realized are from 18 cents to 25 cents per pound, according to season and state of the market.

The freight rates are at present rather high, being nearly two cents per pound to Vancouver, but as the amount for shipment increases, possibly to car-load lots, the cost of carriage should be reduced.

A large quantity of butter is marketed locally, at nearly all points visited, and the quality as usual presents a variety of grades. Virden, Grenfell and Wolsely, have adopted an excellent system of inspection of all butter disposed of at those points. A butter inspector is appointed, and it is necessary for all butter to be inspected and graded by this person, and the price is regulated according to grade. There are generally three grades—Nos. 1, 2 and 3—and the difference in the quality as represented by the grades is two or three cents per pound per grade. This system should be adopted at every place where butter is sold, as it not only puts a premium on quality, but protects the merchant, who, being dependent on the patronage of those having butter to sell, finds it almost impossible to pay different prices on his own responsibility.

### *Cheese Factories.*

At the fifteen cheese factories visited, with four or five exceptions, the quality of goods manufactured, the buildings and equipment, were much inferior to the creameries. The majority of the buildings are of cheap construction. In some no arrangements have been made for heating water, and in consequence very little of it is used, and the idea of running a cheese factory for six months, without hot water or a scrubbing brush, is a rather startling one. The other factories are nearer what they should be; with buildings properly constructed, and equipment very good, they are manufacturing a very fair article. With one exception, the cheese factories are owned and managed by private individuals. At nearly every place the amount of milk supplied is small; the cost of manufacturing is therefore high, and the returns on investment are doubtful. The amount of milk delivered at the factories varies from 1,200 lb. per day to 6,000 lb. per day; and the total make of cheese during the seasons of 1890 at different factories ranged from 10 tons to 20 tons each.

The quality of milk delivered is very good, the percentage of butter-fat on individual samples showing from 2 to 4·6 per cent, with averages from the milk vats of 3·75 per cent to 4·2 per cent. In taking samples of all the milk delivered at the several factories there were few indications of adulteration, but in some cases there were, and those mostly in the locality where the factory has been in operation the longest. The number of samples showing less than 3·5 per cent butter-fat were very few; a great many showed about 4 per cent.

The average number of pounds of milk to make a pound of cheese is from 9·12 to 9·34, and although these averages are exceedingly low, the milk was not always handled to the best advantage; if it were, even these averages may be lowered. The prices obtained were good—the ruling figures received at one factory during

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1890 being 10½ cents. Others received from 12 to 9 cents, according to the state of the market and time of the season. There are a large number of small cheese made, from 10 to 15 pounds in weight, and higher prices are realized for them than for the big cheese, and in this way the average price is increased. The cheese are nearly all handled by Winnipeg houses, and go to supply the local trade and British Columbia. The mode of paying for manufacturing differs at almost every factory. One factory charges 25 per cent of the gross proceeds; another 2½ cents per pound of cheese; another buys the milk at 70 cents per 100 pounds, and in every case the patrons deliver the milk and receive their share of whey in return. At one factory the proprietor charges 3 cents per pound of cheese, provides all the furnishings, collects the milk and retains the whey. In one small factory the proprietor is running it purely for the love which he bears towards his neighbours. He makes the cheese for 1½ cents per pound; the highest amount of milk received any one day during the season was 2,400 pounds, and calculate as you will, he loses money. The cost of dairy supplies and furnishings is very high. Cheese boxes, from the sawed material made up at the factories, cost from 16 to 18 cents per box; Hansen's extract of rennet, $2.40 to $3 per gallon, and Hansen's annatto, $2.40 to $2.50 per gallon, in Winnipeg. The drawbacks at present in the manufacturing of cheese are the engagement of incompetent men and poor equipment of the buildings. In some cases where there are good men, everything is so poorly arranged that they become careless. The reasons given for employing non-competent men are that the factories are so poorly patronized and the returns so small that it is impossible to pay the wages good men would demand. I don't wish to be understood as saying that there are no good cheese manufactured. Many of the factories visited had some very fine cheese on hand, but there was a lack of uniformity.

The set-back caused by the closing down of a creamery or cheese factory, owing to mismanagement, will do more harm than can be undone in five years, and, therefore, it is imperative for the success of any concern that it be started on a fair business basis.

*The Babcock Milk Tester.*

The wonderful simplicity and undoubted reliability of the Babcock milk tester renders it invaluable to the dairying interests. Any person of ordinary intelligence can learn to use it in a very short time. The great difference in the per cent of butter-fat contained in milk from different herds, the undoubted value of milk according to its butter-fat, goes to show the injustice of the present system of paying for milk. The immediate adoption of the system of paying for milk according to the per cent of butter-fat contained is most desirable, not only for its being the only equitable way, but as a prevention against all frauds.

I feel I cannot close this report without acknowledging the great help received in the work from the press, at all points visited. The many long reports of meetings, notices given of intended movements, the objects of the work, and anything of interest which may have been said, were brought before the notice of a large number of people who, owing to distance or pressure of work, were unable to attend the meetings. The agricultural and dairy papers of Winnipeg, going into thousands of homes in all parts of the country, together with the local press, wielding an influence in its more immediate vicinities, evinced an unusual willingness to do anything in the interests of this new movement.

The remarkable hospitality of the people and the many kindnesses received at their hands is a most pleasant remembrance of my trip, and the future prospects of this young country, naturally endowed with such wonderful resources and inhabited by such a whole-souled people, are indeed bright.

Since my return to Ottawa, early in November, my time has been spent chiefly in the dairy, carrying on a series of milk tests, results of which in part have been handed in to you.

I have the honour to be, Sir,

Your obedient servant,

J. B. McEWAN.

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## (9) Report of C. F. Whitley.

Prof. Jas. W. Robertson,
Dairy Commissioner, Ottawa.

Sir,—I have the honour to submit to you a report on my work in Manitoba during the summer of 1891.

In accordance with instructions received from you I arrived in Ottawa on 11th June, and was engaged at work in the dairy, as well as at other experimental work of the department.

I left for the North-West on 13th July, *viâ* the lakes, on the SS. "Athabasca." The following day, while steaming up the "Soo" a collision occurred with the American steam barge "Pontiac." For a few minutes considerable excitement prevailed, as the barge was seen to sink, and the damage to the Canadian Pacific Railway boat was unknown. It was soon found, however, that the Clyde-built steamer was uninjured below the water line.

Brandon was reached on 16th July, late at night. A run out to the experimental farm the next morning was repaid by the sight of magnificent crops of all kinds, the wheat especially attracting notice, as much of it was then over 4 feet 9 inches high and heading out splendidly. The shade trees and wind breaks were doing remarkably well, while a beautiful assortment of richly hued garden flowers added most pleasing variety to the scene.

### *General Plan and Object.*

The general plan and object of the work was to visit all parts of the Province of Manitoba, holding meetings of farmers and others interested in dairying, with a view of promoting an improvement in the make of butter. The route mapped out for me lay along the Manitoba & North-Western Railway from Portage la Prairie, Manitoba, to Saltcoats, North-West Territories; then from Portage along the main line of the Canadian Pacific Railroad to Oak Lake, Manitoba, and then on the Pembina Mountain Branch from Morden to Deloraine.

### *Meetings.*

Short circulars were mailed to leading farmers and townspeople of the several districts, asking their co-operation in securing meetings, and providing cream for the practical illustration of butter-making. Small posters were also issued at the same time and freely distributed, calling the attention of the farmers and general public to the meeting, while ladies were particularly invited. The wisdom of this is at once apparent when it is remembered that at present the prairie province is not so rich in creameries as her elder sister, Ontario; therefore almost all Manitoba butter is made by the ever-industrious farmer's wife in the home dairy. In all 29 meetings were called, but owing to the extreme pressure of an enormous harvest, and the scarcity of efficient farm help, attendance was secured at only 20. At 13 of these cream had been kindly provided, and as a complete churning outfit was carried (such as every farmer should possess), it was duly churned and the whole process carefully explained.

The attendance varied considerably, in one case reaching 200, but at another dwindling to 9. During the first month there was a good average, but the urgent business of harvest made it advisable for the meetings intended for September to be postponed till October. During the last fortnight it was specially arranged to take in as many as possible of the fall exhibitions on the Deloraine line, and in this way to meet a larger number of people. The total attendance was about 730, which gave an average of 36 for each meeting.

During the operation of churning addresses were given, in which the following points, amongst others, were touched upon: Care of milk; improvements necessary in dairy stock; longer milking season; proper feed, care and attention to animals; the advantages of dairying and mixed farming compared with exclusive grain growing; the importance of the export trade in dairy products and the advantages

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of the factory system. Special stress was laid on the importance of the most scrupulous cleanliness in all stages of butter-making; straining of cream into the churn; the use of a reliable dairy thermometer; neatness in packages for the market, as well as the necessity of good milk-houses and storekeepers' cellars.

In almost every instance a very lively degree of interest was manifested in the meetings, as people drove in considerable distances to attend them. When the address proper was over a long time was spent in answering questions relative to the subject-matter touched upon, as well as other points connected with dairying. It was noticed that, in a few cases, the object of the meeting was quite misunderstood; several times the question was asked, "Are you peddling some new kind of churn?" while at others some good people seemed considerably astonished and not a little annoyed that the various articles in use were not for sale. It would have been an easy matter to dispose of several hair sieves, floating glass thermometers and bags of salt at remunerative prices. The use of the first named seemed to be quite a novelty to the majority, and much surprise was manifested when some particularly nice-looking cream was brought into the meeting, to find how successfully the "little detective" captured the stray sundries and prevented their trespassing into the churn. To many, also, the thermometer was a stranger, so that a lot of guess-work in butter-making must have been done, and resulted in disappointment.

This being the first season when work of this kind has been undertaken in the province, the interest manifested may be considered very satisfactory, especially when other conditions are taken into account. Judging by the remarks of those present at the meetings the probabilities are that a second series of such gatherings will be attended by a far larger number of the inquiring and enterprising portion of the agricultural population.

In most places some good friend of the dairy cow, and dairying in general, had taken pains to secure a suitable room and have all needful arrangements made. At others some hurrying around had to be done to secure a meeting place. On one occasion school was dismissed early to leave the room at liberty, and the dairy meeting had to be a little hastened to allow of a case being heard before the local magistrates. At another a half-finished warehouse was called into requisition, there being no other available building. The audience dispersed themselves gracefully amongst a profusion of nail kegs, window sashes, and carpenter's tools. At yet another place no public hall of any kind existed, so that those interested in the movement assembled in the hotel parlour. It might be as well to intimate at this point, that this was a non-licensed town.

Most of those present at the meeting expressed a desire to receive the Dairy Bulletins regularly, and a list of about 600 was therefore forwarded to the office at Ottawa.

### *Condition of Dairying.*

The old saying that "wheat is king" still obtains in a large portion of the province, but it is an open secret that some of the clearest thinking men of the country are not satisfied with the returns yielded by the staple cereal, and are seeking after something that will give more regular and sure profit. It is no idle claim when it is asserted that the industry of dairying will save the farmer from disappointment and enable him to count on a steady income. To me it seems that exclusive wheat-raising is a very risky style of farming, to say the least of it, and some of the oldest residents in the province and those even in the more renowned wheat districts have decided that mixed farming and dairying may be introduced with advantage. Hence we find that in many localities the advisability of erecting a cheese factory or creamery has already been talked about.

Along the Manitoba and North-Western Railway there are three creameries in operation. That at Shoal Lake is owned by Mr. R. Scott, and is in many respects a good model. The building is beautifully situated on the edge of the lake, and with the dwelling house and its natural setting would make a charming and fitting sketch for an artist's pencil. When visited in August the place was in very good shape

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and beautifully clean. An excellent quality of butter was being manufactured by the most approved methods and modern appliances, and stored in a large airy cellar ready for shipment to British Columbia. The make for the season of 1890 was close on 26,000 lb., and the year before was about half as much more. There is a steady demand in British Columbia for A1 "Manitoba Creamery," and one of the leading Winnipeg dealers stated he could not nearly supply all the quantity that is asked for in that province. Notwithstanding this, it seems hard to move the generality of farmers to support the creameries, and as a consequence the routes for collecting cream are so long that considerable expense is incurred. Little by little, though, the number of dairy cows is being increased, and it is most gratifying to notice that in this particular section Mr. R. Scott is introducing pure-bred Ayrshire cattle. A private "creamery" not 1,000 miles from Birtle afforded a striking contrast to the above. A single door separated it from the stable, and in one corner of the not over-clean apartment a man was patiently revolving a barrel churn filled to within 2 inches of the top. A separator had been in use but was discarded. Truly there is some need for enlightenment as to the best dairy practices even in this wonderful province. It is but fair to state that the owner intended erecting a more suitable building at an early date.

At Russell is to be found the creamery of the Barnardo Home, where the most able and genial manager, Mr. Struthers, has employed a first-class Danish butter-maker. As a consequence there is a ready sale in Winnipeg for the neatly packed tubs and delightfully tempting prints, all tastefully branded with a conspicuous "B."

At Saltcoats, N.W.T., a creamery is in operation controlled by Mr. Cory. About 1,400 lb. of butter per week were being made up and shipped regularly. All along this section of the country there is ample room for an immense extension of the industry. A drive round with one of the cream-collecting vans revealed the fact that over 30 miles had to be travelled to collect about 45 gallons of cream. And this in a section where abundance of good water and natural herbage are found. It is sincerely to be hoped that the present number of 76,000 milch cows in Manitoba, owned by the 18,940 farmers, will speedily be more than trebled. The cream collected on that route was in all stages of ripeness, and in one case perfectly sweet. Twelve cents per inch of butter-fat, as revealed by the oil-test churn, was the price paid at the creamery. Here, as well as in Manitoba, the milk-houses presented every variety of appearance. The thrifty house-wife, in some cases, had prevailed on her prudent spouse to erect a very convenient and well-ventilated milk-house, where the array of shining pans, each with its quota of thickly creaming milk, presented a sight most pleasing to the eye. But as a general rule the system of setting is to use deep cans lowered into a well or placed in a box of suitable depth, through which cold water is made to run.

Unfortunately, however, in a great many instances too little attention is paid to cleanliness of the surroundings of the milk while creaming, and of the cream while ripening. Some of the poor sod erections which do duty as milk-houses are also utilized as a storehouse for various articles of diet in all stages of cooking, while potatoes, not always in the best state of preservation, and even onions, are to be found therein. Occasionally an old boot is thrown in, apparently to preserve it from the weather.

With this lack of the first essential of successful dairying—cleanliness—it is scarcely to be wondered at that in some districts the stores are burdened with an excess of unmarketable butter which the storekeepers would far rather be without. Under the present conditions, however, the indulgent dealer can scarcely do otherwise than accept it in trade, for it frequently happens that the best customer at the store is the poorest butter-maker. Thus it has sometimes occurred that the Indians in the neighbourhood of certain localities have been made the recipients of tub butter that was positively unfit for sale. The old trouble arises again—that these poor makers are invariably the ones who consider their butter of prime quality; they are, therefore, averse to reading on the subject or attending dairy meetings.

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In the hope of effecting a remedy for this deplorable state of affairs, it is suggested that storekeepers be supplied with printed slips containing a few suggestions as to the essentials of good butter-making, such slips to be distributed as the tubs are sold. It would be well to draw special attention to the absolute necessity of using a better quality of salt. Perhaps by degrees the storekeepers will see that it is to their own ultimate advantage, as well as that of the country, to refuse absolutely bad butter. It was found in several cases that, contrary to the general belief, an extra price of 1 or 2 cents per pound was given to those who had proven their right to the claim of making better butter than the average. It is this home-made butter which demands immediate attention; the creameries with their uniform product are doing well, but these odd lots of every colour and flavour (the latter partly obtained, it must be admitted, in the cellar of the country store), may obtain a bad name for Manitoba butter in the markets. An instance might be noted here of the demand there is and always will be for first-rate butter. At the Jamaica exhibitions M. de Laborderie had some samples of his gilt edge butter from the St. Malo creamery put up in 1 and 2-pound tins. These were noticed there by a San Francisco firm, with the result that a trial order was placed with M. de Laborderie for 600 pounds, at 30 cents, with freight and duty paid. During the season of 1890 it might be mentioned that over 100,000 pounds were shipped at Otterburn from the three creameries.

*Natural Adaptation.*

Possessing as it does such an abundance of natural grasses with extraordinary nutritive properties, climatic conditions which are peculiarly favourable to the proper handling of milk, and the satisfactory transportation of the finished product, and speaking generally, good water, Manitoba should speedily make a name for herself for the uniform excellence of her dairy produce. She has already won rich laurels for herself in the eastern provinces in competition with the whole of the Dominion, and a great future assuredly awaits her as regards dairying, if but proper attention is at once paid to the careful production of uniformly fine quality.

The soil is famed the world over for its wonderful richness and productive power, but that does not mean that its capacity for exclusive wheat-raising is unlimited, as some settlers would seem to imagine. It is found, after careful experiments, that manuring is beneficial—an earlier crop results. It follows, therefore, that he is the wise farmer who keeps stock to use up the abundance of straw and return valuable manure; he is the wiser farmer who keeps such qualities of cattle as will yield him still more valuable returns in butter and cheese.

Nature provides an abundant supply of variously flavoured grasses, so that the enterprising dairymen need scarcely ever fear a shortage. These are capable of being still further developed, as shown by the experiments at the Brandon experimental farm. Again, the corn crop, which is doing so much for Ontario dairymen, can be utilized to advantage for feeding in Manitoba, provided it is cut before August. An average yield for the province is at least 12 tons per acre, which may be fed with excellent results as to the quantity of milk and colour and body of the butter. The "North Dakota" promises the best. Bran, to be had at about the same as Ontario prices, can also be profitably fed, and it is expected that the experiments now in progress at the Central Farm, Ottawa, will prove that frozen wheat, when it does appear in the country, can be made to yield a larger return when converted by the animal economy into dairy products than when marketed at 45 cents per bushel or less. Roots all over the province are exceptionally fine.

In most districts good modern appliances for dairy work are on sale, though in some cases the old dash churn and some very primitive methods are affectionately adhered to. Here and there an old wooden bucket is used for milking, but as a general rule good tin utensils or the indurated fibre pails of the Eddy Company are to be found in active demand and extensive use. Questions were frequently asked concerning centrifugal cream separators and the butter extractor, and it is believed that the former will be found in pretty fair numbers within the near future.



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*Stock.*

All kinds of stock thrive remarkably well in the province; sickness is very seldom met with. Horses scarcely come within the scope of this brief report, but one could not help being struck by the beautiful type of drivers in use at Winnipeg and Brandon especially; also by the large numbers of heavy horses imported from Ontario at high prices.

Almost every breed of cattle is represented in Manitoba, and the principal exhibitions made it evident that many excellent individuals, as well as herds, are owned by pushing stockmen. Beefing cattle, in certain districts, are in special favour, and, though the Manitoba farmer may only receive $30 for a steer which sells in England for $85, he finds it profitable to raise them. The milking breeds are by no means neglected, and decided improvement is being made in the common cattle by the use of pure-bred sires. Ayrshires and Holsteins seem most in favour, and many importations from the east have been made. It is gratifying to notice that numbers of people are not satisfied with less than a 10 months milking season, and therefore a habitude of prolonged flow is being fixed. Now and then one comes across a man making a good record with a cow in another way. For instance, a case was found at Whitewater where a farmer raised 6 calves on one cow inside 18 months. The weight of veal in 6 months from two of them was 378 and 370½ lb., respectively, and $41.50 were realized.

Comparatively few sheep are at present to be found, but there seems to be a good opening for profitable investment in these "golden-hoofed" animals.

The number of swine might be considerably increased, for it appears strange to find storekeepers with stocks of eastern-cured bacon on hand, and hams from the United States on sale in Winnipeg.

One cannot take such a trip as I took without being impressed by the push and energy of Manitobans. The season of 1891 has seen, for instance, a large increase in the number of substantial farm buildings. On all sides, too, cheerfulness, contentment, a solid faith in the capabilities of the province, appear to prevail. One feels, therefore, that for the intelligent farmers already located there, as well as for the thousands who are bound to be attracted thither, a happy and prosperous future is in store. Everywhere I met with great kindness and courtesy, and special thanks are due to Mr. Struthers, of Russell, and the Hon. Walter Clifford, of Austin, for their generous hospitality.

I have the honour to be, Sir,
Your obedient servant,
C. F. WHITLEY.

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APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

# THIRD ANNUAL REPORT

OF THE

# DAIRY COMMISSIONER

FOR THE

## DOMINION OF CANADA

FOR

## 1892-93

*PRINTED BY ORDER OF PARLIAMENT*

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Hon. J. C. Patterson

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# APPENDIX

TO THE

# REPORT OF THE MINISTER OF AGRICULTURE

BEING

## REPORT OF THE DAIRY COMMISSIONER.

OTTAWA, 30th June, 1893.

The Honourable
The Minister of Agriculture.

SIR,—I have the honour to submit my third annual report as Dairy Commissioner for the Dominion of Canada.

There is no abatement of the interest and satisfaction with which the *Dairying Service* has been received by the farming community since the date of my last report.

The movement in favour of the manufacturing of butter during winter, in factories where cheese-making has been carried on during the months of summer, received a strong push forward by the establishment of the winter-dairying stations at Mount Elgin and Woodstock, Ont., in 1891. During the winter of 1892-93, four butter-making stations were under my charge in the Province of Ontario. These were at Mount Elgin, Woodstock, Wellman's Corners and London. At all of them the patrons delivered the whole milk and carried home the skim milk in the same milk cans. The delay necessary to obtain it seldom exceeded 15 or 30 minutes. At the desire of the patrons it was decided to discontinue the home-setting of the milk and the cream-gathering plan at Woodstock, and to run the factory on the centrifugal separator plan. At Mount Elgin and Woodstock, the patrons furnished supplies of milk in much larger quantities than during the previous winter. This branch of dairying may be considered as fairly well started and established in Ontario. A summary of the business at all the Experimental Dairy Stations is given in Part IX.

The World's Columbian Exposition at Chicago afforded an excellent opportunity for exhibiting the dairy products of Canada in such a way as (1) to advertise the suitability of Canada as a field for successful dairy farming, (2) to illustrate the progress which has been made by Canadian dairymen in the arts of manufacturing cheese and butter, (3) to win a higher reputation at home and abroad for their fine quality, and (4) to stimulate our dairymen to strive for further improvements in their methods and products. The success which attended our efforts in this connection is abundantly satisfactory. Although the official report from the World's Columbian Commission has not yet reached my hand, I have ventured to open this re-



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port and to insert here (under date Dec. 1, 1893,) a statement which may be taken as substantially in accord with the recommendations of the judges of these exhibits.

In the competition in the month of June, 162 exhibits of cheese were sent from Canada; and 129 lots were recommended by the judges for awards of diplomas and medals. Thirty-one of these lots received a higher number of points on the score cards, than the highest number of points awarded to any exhibit from any other country in the same classes. At the June competition there were 43 exhibits of butter from Canada; and 13 lots were recommended for medals.

In the competition in October, 687 exhibits of cheese were entered from Canada and 607 of them were scored high enough to entitle them to be recommended for medals. In this competition ten exhibits of cheese received awards of 99½ points out of a possible of 100 points for perfection; and altogether one hundred and twenty-seven lots of Canadian cheese received a higher number of points on the score cards than the highest score to an exhibit from the United States in the same classes. There were 167 exhibits of Canadian butter, of which 27 lots were scored high enough to entitle to awards. A more extended report of Canadian dairy products at the World's Fair has been inserted in Part X.

In November, 1892, I received permission to visit Great Britain, in order to look after the sale of some of the cheese and butter from the Experimental Dairy Stations in the markets there, and at the same time to call attention to the food producing resources of Canada, the purity and wholesome excellence of Canadian dairy products, and the nature and scope of some of the educational work which is being done by the Government in connection with dairy farming. It was also my intention to make investigation, into the preferences of the British markets in the matter of food products and to make such inquiries into and observations of the condition, systems and methods of agriculture which were prevailing in Great Britain, as the limited time at my disposal would permit. I was fortunate in being the bearer of a few letters of introduction from His Excellency the Governor General, Lord Stanley of Preston, to gentlemen in England who are distinguished for their leadership in agricultural matters there. To the thoughtful kindness and magnanimous courtesy extended by His Excellency, I ascribe no small share of the success which attended the other parts of my mission. Critical and appreciative articles on the progress and possibilities of Canadian agriculture appeared in many of the leading journals of Great Britain. I believe some of these have more than a passing interest and capability of usefulness for the farming community of Canada. In consequence, I have devoted a chapter in this report to that mission and have inserted several of the articles from different newspapers of world-wide reputation, as well as reports of addresses which I had the honour to deliver in Liverpool and London.

## SUMMARY OF THE WORK IN THE PROVINCE OF ONTARIO.

In Ontario, Branch Experimental Dairy Stations were conducted during the winter of 1891-92 at Woodstock and Mount Elgin, to introduce the practice of manufacturing butter during the winter months in factories where cheese-making had been carried on during the summer. These were entirely successful and satisfactory to the farmers who furnished milk. Particulars of the cost of equipment and extent of the business, and the opinions of some of the leading patrons, are given in my last annual report from pages 4 to 13.

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When the final payments were made to the patrons on account of the business of the season 1891-92, the following circular of explanation was sent:—

OTTAWA, July 27th, 1892.

DEAR SIR,—The advance sheets of part of my Annual Report, which are inclosed herewith, give particulars of the winter dairying at Mount Elgin and Woodstock Dominion Dairy Stations up to April 30th, 1892. There was some delay in obtaining the final account sales of the shipments of butter which were sent to Great Britain. Some of the butter was held in warehouse at Liverpool and elsewhere, longer than it should have been held by the consignees if my directions had been followed. In consequence, it came into competition with the grass made butter of England, and failed to realize a price which was quite satisfactory. Besides there were complaints concerning the quality of a few lots of it, from the development of a flavour which seemed to come from the feeding of roots, which had been kept badly during the winter.

I had the honour to recommend to the Minister of Agriculture, that the patrons of the Mount Elgin Dairy Station be paid for the butter which was manufactured to the end of February, at 24 cents per pound, and for the butter manufactured during March and April, at 21 cents per pound, and that the patrons of the Woodstock Dairy Station be paid for the butter which was manufactured to the end of February, at 22 cents per pound, and for the butter manufactured during March and April, at 21 cents per pound. The difference in the price between the Mount Elgin and Woodstock makes of butter is explained at page 12 of the report. It is my opinion that the butter could have been sold to realize these prices for the patrons, had it been sold without any regard to advertising the growing importance and possibility of developing a large trade in winter-made butter with Great Britain in the near future. These prices should be satisfactory to the patrons, as the result of the first experiment in this direction, and I am confident that in coming years, with market prices equal to those which prevailed during the winter of 1891-92, our winter-made butter from creameries would command a relatively higher price. The experience of the one season has brought to light a few facts which I take the liberty of emphasizing here for the benefit of those farmers and factorymen who intend to continue or to commence this branch of dairying.

I. An abundant supply of succulent feed should be provided for the cows for fall, winter and spring. Corn ensilage is cheapest and best; corn fodder comes next in point of economy and suitability; carrots, mangels, or sugar beets, with hay, straw and bran or meal, make excellent rations, but they cost too dear for profit. At pages 26 to 44, 78 to 84, and 99 to 109 of my Annual Report (of 1891-92) detailed information on the combinations of rations will be found.

II. Where these feeds have not been provided by the patrons, to alter a cheese factory and equip it for winter butter-making would only invite failure and create dissatisfaction.

III. As far as practicable, milking cows should be kept in stables where the temperature is comfortable,—never below 45° and never above 60° Fahr.

IV. The milk from a few fresh calved cows imparts such a quality to the flavour of the whole quantity of butter, which may be made in a creamery from November to March, as will increase its value in the British market by from 1 to 4 cents per pound.

V. To supplement the general directions which are contained in my Annual Report, I will furnish specific information, to those who apply by letter, giving the plans of buildings and other particulars on the details of effecting the alterations in cheese factories, on the most suitable packages in which to put the butter, on the engagement of competent butter-makers, and on the shipment of butter to the British market from those factories whose managers desire to dispose of the product in that way.

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VI. It will be better policy to delay for one year the altering of a cheese factory and its equipment for butter-making during the winter, than to begin this new business before the manufacturer and patrons are both quite ready to conduct it with success.

I have the honour to be,
Your obedient servant,

JAS. W. ROBERTSON,
*Dairy Commissioner.*

---

From June to September, 1892, experiments were conducted at Perth, in Lanark County. One main object of these experiments was to determine the relation which the percentage of fat found in milk of different qualities, sustained to the quantity and quality of cheese which could be made therefrom. The details of this work, with a summary of the conclusions arrived at, will be found in the report of Mr. J. A. Ruddick, in this volume. The Mammoth Cheese which was manufactured for the Canadian dairy pyramid at the World's Columbian Exposition, was made at this station. It was intended as an advertising device, to attract the attention of the public everywhere to the magnitude of the dairy industry in Canada, and through that, to the opportunities which the country offers for successful dairy farming. It may be considered as one of the best advertising hits of the whole Exposition. Further details concerning it are given in the report on Canadian dairy products at the World's Columbian Exposition.

During the winter of 1892–93, I took charge of four butter-making stations, respectively, at Mount Elgin, Woodstock, Wellman's Corners and London.

The agreements with the proprietors of the cheese factories, and the patrons who supplied the milk, were substantially the same as during the previous year at Mount Elgin and Woodstock. The substance of these was as follows:—

1. The company owning the premises are to put the boiler-room into a frost-proof condition, and to put double windows and double doors where they are required, in order to make the making-room tenable during the winter.
2. The Dairy Commissioner agrees to pay $100 as rent for the use of the premises and such of the apparatus in them as he may desire to use.
3. The Dairy Commissioner agrees to put into the factory the additional apparatus and equipment necessary for the manufacture of butter.
4. That apparatus and equipment may become the property of the company when the butter-making season is ended, by mutual agreement as to price, or the Dairy Commissioner may remove the same.
5. The company shall keep the buildings fully insured, as usual, for their own benefit.
6. The Dairy Commissioner agrees to remove the butter-making apparatus and utensils, and to leave the building in at least as good a state for cheese-making as when he took possession of it for butter-making, at any time when notified to do so, after the middle of April.
7. At Mount Elgin and Woodstock, in conformity with a promise which was made to the effect that the terms of the original agreement would be good for two years, at the option of the proprietors and patrons of the factory, the Dairy Commissioner agrees to manufacture butter from the milk furnished at the factory, at the rate of 3 cents per pound of butter. That rate includes all charges for labour, tubs, fuel, salt and other furnishings. (At Wellman's Corners and London the charge for manufacturing was put at 3½ cents per pound of butter. The specially low rate of 3 cents per pound was made at first, to induce the farmers to go into

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this new departure in dairying. Now that it is recognized as profitable to them, the charge for manufacturing is put at or near what the actual cost will be to the patrons when the business is large and is run by them on their own behalf.)

8. The Dairy Commissioner agrees to sell the butter to the best of his ability, and to pay to the patrons who supply milk, the net proceeds from all sales of products (after deducting the charge for manufacturing), in proportion to the quantity of butter which is obtained from the milk furnished by each patron, as determined by the Babcock milk tester.

9. The Dairy Commissioner agrees to pay an advance of 15 cents per pound of butter to the patrons after the end of every month.

10. The patrons will receive at the factory about 80 pounds of skim milk, and 10 pounds of buttermilk per 100 pounds of milk furnished; and in case the buttermilk be sold, it will be accounted for to the patrons, and the proceeds distributed to them.

The additional apparatus required for the factory at Wellman's Corners for the manufacture of butter upon the centrifugal cream separator plan, were as follows:—

| | | |
|---|---|---|
| 1 | Centrifugal cream separator (capacity 3,000 pounds per hour) | $ 350 00 |
| 1 | 10 horse-power engine, 2nd hand, complete | 120 00 |
| 1 | Revolving churn (300 gallon capacity) | 45 00 |
| 1 | Power butter-worker | 57 50 |
| 1 | Hand butter-worker | 12 00 |
| 1 | Pair butter scales | 10 00 |
| 1 | Strainer for cream; 1 hair sieve | 4 00 |
| 1 | Butter printer (lettered) | 5 00 |
| 1 | Large dipper, 40 cts.; 3 dairy pails, $2.40 | 2 80 |
| 2 | Perfection gates with couplings (for cream vat) | 8 00 |
| 2 | Butter ladles; 1 butter spade; 1 butter packer | 2 50 |
| 1 | No. 20 Hancock ejector (for elevating skim milk) | 9 75 |
| 1 | Coal stove | 12 00 |
| | Carpenter work, shafting, pulleys, belting, stanchions, pipes, fittings and teaming | 277 00 |
| | | $916 05 |

A summary of the business at each station is given in Part IX.

*Mr. J. A. Ruddick's Report (Ontario).*

1. Mr. Ruddick reports upon experiments conducted in cheese-making at Perth Experimental Dairy Station under the three headings of:—(1) Experimental investigations to determine the quantity and quality of cheese made from milk containing different percentages of fat; (2) The effect of high *versus* low cooking temperature on the curd and cheese; and (3) The effect of setting the milk at different conditions as to degree of ripeness.

2. He reports the main features of the work at the winter butter-making station at Woodstock, Ont., of which he had charge.

3. He attended and gave addresses at thirty meetings held in the interests of dairying, being present at the annual meetings of many of the cheese factory companies.

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4. He reports on some miscellaneous work, including the working dairy at the Sherbrooke Exhibition, assistance in preparing the Mammoth Cheese, and attendance, at Chicago in connection with the exhibit of Canadian dairy products there.

*Mr. J. B. MacEwan's Report (Ontario.)*

1. Mr. MacEwan reports on the work of testing milk by the Babcock tester at the dairy on the Central Experimental Farm.

2. He was released from his engagement as one of my assistants for five months of the summer, in order to act as dairy instructor for the Dairymen's Association of Eastern Ontario. He visited 184 cheese factories, met 244 cheese-makers, and held 20 meetings.

3. He reports on certain faults which he found prevalent in connection with cheese factories and cheese-making. He states that he observed the effects of very much carelessness as to condition and appearance of the buildings, and that he found a tendency on the part of cheese-makers to over-ripen the milk before adding the rennet.

4. He reports on the work at the butter-making station at Wellman's Corners, Ont., of which he was put in charge after he returned from his leave of absence. The Dairy Station was used in some measure as a school of instruction during the winter. Twenty-three cheese-makers visited it during the winter, to learn something of the art of making butter. He attended 12 meetings.

Reference to the work which they severally did in Ontario during part of the season, will be found also in the reports of Messrs. T. J. Dillon (P.E.I.), C. C. Macdonald (Quebec), and R. Cornett (Manitoba).

## SUMMARY OF THE WORK IN THE PROVINCE OF QUEBEC.

A combined Dairy Station and Dairy School, was erected at St. Hyacinthe, Que., by the Dairy Association of the Province of Quebec. It was placed under the directorship of the Dairy Commissioner in accordance with the following agreement which was made with the Dairy Association :—

MEMORANDUM of Agreement between the Dairy Association of the Province of Quebec and the Dairy Commissioner for the Dominion, *re* the proposed Experimental Dairy Station and Dairy School for the Province of Quebec.

1. It is agreed that the Dairy School shall be located at St. Hyacinthe, Que.

2. On behalf of the Dairy Association of the Province of Quebec, it is agreed that the Association will provide a building and premises suitably equipped for the manufacture of butter and cheese, and for the giving of practical illustrations and instructions to pupils in these branches of dairying.

3. The building and premises (equipped as stated in paragraph 2), are to be put under the charge of the Dairy Commissioner for the Dominion, free of rent or charge for the use of the same.

(*a.*) Rent, interest, payments on capital account and any other charge or claim on the premises on behalf of those persons who advance money for the erection and equipment of the building, or any other persons whatsoever, are not to be considered as claims upon the Dairy Commissioner or the Department of Agriculture.

4. The Dairy Association of the Province of Quebec hereby agrees to pay to the Dairy Commissioner, the sum of one thousand dollars ($1,000) per annum, to be

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applied towards the maintenance of the school; payable in two equal sums on 2nd of January and 2nd day of July of each year, while the agreement continues.

5. In consideration of the foregoing, the Dairy Commissioner agrees to provide for giving thorough practical instruction in cheese-making and butter-making to all pupils or others who are entitled to receive such by the certificate of the Dairy Association of the Province of Quebec. The instructions are to be given in the French and English languages.

6. The Dairy Commissioner agrees to meet all the expenses of working the Dairy Station and School, including wages, fuel and furnishings.

7. The Dairy Commissioner agrees to carry on such experimental investigations in the manufacture of butter and cheese as may be called for by the Association, when such work is practicable in conjunction with the experiments of the Dairy Station.

8. All receipts from the charges which may be made for manufacturing the cheese or butter, are to accrue to the Dairy Commissioner, to be administered as the funds of his Department; and all receipts from the sales of products obtained from milk which has been purchased by the Dairy Commissioner, shall accrue to his Department.

9. Such persons as the Dairy Association of the province may designate, will be received as pupils free of charge at the Dairy School.

10. The Secretary of the Dairy Association of the province of Quebec will be paid by the Association. He shall keep the books of the Dairy Station as between the patrons who furnish milk or cream and the Dairy Commissioner; he shall be afforded every reasonable opportunity for obtaining and disseminating information on the results of the experiments at the Station; he shall be under the authority of the Superintendent of the Dairy Station in that part of his work which is directly connected with the management of the Dairy School and Station.

11. This agreement is to continue in force for one year and until it is terminated by either of the parties to it giving a notice in writing to the other party of an intention to withdraw from the agreement. Six months after such notice is given and received by either party, the agreement shall be considered at an end.

For the Dairy Association of the Province of Quebec.

J. DE L. TACHÉ, *Secretary.* T. MONTMAGNY, Ptre., *President.*

P. S. The date of the instalments to be paid to the Dairy Commissioner is left as originally written; but for the first payment, the Association may have to ask that it should be made only on the 2nd of July, 1893, as the payments of the yearly subsidy is only made in July each year.

J. DE L. TACHÉ, *Sec.-Treasurer.* T. MONTMAGNY, Ptre., *President.*

Sept. 26th, 1892.

During the first winter, although the preparations for giving efficient instruction were rather inadequate, 214 pupils attended the short course of instruction; 163 took lessons in cheese-making, and 51 in butter-making. Particulars concerning the work at the school are given in the report of Mr. J. D. Leclair, Superintendent there.

A full and interesting summary of the work in the province by Mr. J. C. Chapais, Assistant Dairy Commissioner, sets forth what was undertaken in the way of giving instructions to farmers, cheese-makers and butter-makers at many different points.

Considerable attention has been attracted during the season to the improved reputation of "French cheese" and of cheese from the province of Quebec. In Part VIII., I have gathered together some extracts from reports in regard to this

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matter. Very great improvements have been effected in the quality of cheese during the past three years; and the finest cheese of the highest reputation from other parts of Canada are no longer injured by the quality or reputation of cheese from the province of Quebec, as such. Some of the cheese made in all the provinces are still far from being as fine as they should be and would be, if all the patrons of factories and cheese-makers would carry out their respective duties intelligently and faithfully. A spirit of friendly and wholesome rivalry between the dairymen of the different provinces for a foremost place, cannot but prove beneficial to the whole country.

*Report of Mr. J. C. Chapais, Assistant Dairy Commissioner.*

1. Mr. Chapais gives a statement of the number of meetings which he attended. He visited 4 provinces, 32 counties, 104 localities, and delivered 122 lectures. In the course of these missions he travelled 16,364 miles. Over 17,000 people are estimated to have attended the meetings which he addressed; 29 of his lectures were delivered in Manitoba, 10 in New Brunswick, 4 in Ontario and 79 in Quebec.

2. He discusses how the method of mixed farming, and particularly of dairying, could be extended in Manitoba.

3. He speaks of his ten lectures in the province of New Brunswick, which were mainly concerned with giving information to communities whose men were engaged partly in fishing and partly in farming.

4. He reports upon his labours in the province of Quebec and advocates the extension of dairy farming through the opening of larger numbers of butter and cheese factories and the formation of syndicates.

5. He urges upon the patrons the adoption of the plan of paying for milk according to the percentage of butter-fat which it contains.

6. He states that the Department of Agriculture for the province of Quebec have offered a premium on milk which is furnished to any factory for the manufacture of butter during the winter, to the amount of 5 cents per 100 lbs. of milk in November, 10 cents per 100 lbs. of milk in December, and 15 cents per 100 lbs. of milk in January.

7. He gives a report of one of his lectures on "The Production of Milk in Winter," and of another lecture on "The Possibilities of the Dairy Industry."

8. He makes mention of the holding of an Agricultural Congress at Quebec, and refers to the miscellaneous work he has done, in the way of translating reports and conducting correspondence.

*Mr. C. C. Macdonald's Report (Quebec).*

1. Mr. Macdonald reports on tests with the Babcock milk-tester at the Dairy on the Central Experimental Farm.

2. He outlines the programme which he followed in the province of Quebec during the time when he accompanied the Assistant Dairy Commissioner. He visited 34 cheese factories, 12 butter factories, and gave instruction to 96 cheese-makers and 21 butter-makers. In most cases he spent two days in each factory; one

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day for work in the factory with the cheese-maker or butter-maker, and one day for meeting with the farmers, to discuss the preparation and care of milk, etc.

3. He speaks of the common use of the rennet cup test in cheese factories, for discovering the condition of the milk as to its ripeness.

4. He found an apparent improvement in the condition of the factories, and in the quality of the cheese and butter which were manufactured, particularly where dairy instructors had been employed, and in those cases in which the factories were members of the syndicates.

5. He assisted in managing the Working Dairy at the Exhibition at Sherbrooke, Que., and afterwards spent some time in the county of Compton, giving instruction in butter-making and attending meetings of farmers.

6. In October, 1892, he took charge of the Experimental Dairy Station at London, Ont. He furnishes a statement of the business which was done there.

7. After May, 1893, he proceeded to Manitoba and the North-west Territories, where his work for the summer lay.

### *Mr. J. D. Leclair's Report (Quebec).*

1. Mr. Leclair speaks of the interest taken by the farmers in the Experimental Dairy Station and Dairy School at St. Hyacinthe. It was opened on the 10th January, 1892; 268 applications for admission were received, and of these 214 were accepted. One hundred and sixty-three of the pupils received instruction in the cheese-making branch, and 51 in the butter-making branch.

2. He outlines the programme of the daily work at the school.

3. He points out that the supply of milk during the winter should be largely increased by the farmers in the neighbourhood, and mentions in that connection the bonus which is offered by the Government of the Province of Quebec, for milk which is furnished to butter factories during the months of November, December and January.

### *Mr. H. A. Livingston's Report (Quebec).*

1. Mr. Livingston commenced his labours at the Dairy School at St. Hyacinthe, on the 27th March, 1892.

2. He indicates the particular duties with which he was occupied at the Dairy School, and discusses the different theories which obtain among the cheese-makers of Quebec, concerning the best methods of carrying on their business.

3. He makes some suggestions concerning the way in which the composite samples of milk for the Babcock tester should be handled, so as to ensure accuracy and reliability in the results.

4. He attributes the absence of flavour in cheese, which were made during the winter, to the poor condition of the cows.

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## SUMMARY OF THE WORK IN THE PROVINCE OF NEW BRUNSWICK.

An Experimental Dairy Station was opened at Kingsclear. The following sets forth the agreement which was made with the company owning the premises and the patrons who furnished the cream:—

DAIRY COMMISSIONER'S OFFICE,
OTTAWA, 14th June, 1892.

CHARLES MURRAY, Esq.,
President New Brunswick Dairying Company,
Lower French Village, N.B.

MY DEAR SIR,—Since my return from New Brunswick, after the conference which I had with yourself, Mr. Whitehead and Mr. Hubbard, representing the New Brunswick Dairying Company, I desire to present the following record of our agreement for approval:—

I agree to pay to the New Brunswick Dairying Company, the sum of $215 per year, as rent for the premises and the use of the plant in the Kingsclear creamery. The building and plant are to be insured by the company for their own benefit, and I am to accept no responsibility in that connection.

I further agree to accept the obligations incurred by the New Brunswick Dairying Company in their promise to pay the patrons of the creamery at least 15 cents per pound for the butter which may be made from the cream which they respectively supply.

I have also agreed with the patrons of the creamery to pay to them the net proceeds from the feeding or the selling of the buttermilk.

I further agree to pay to the company the cost of storing the ice which is used during the present season.

I agree also to keep the premises and machinery in a good state of repair.

The company are to provide suitable accommodation and buildings for the carrying on of butter-making and also of cheese-making during the season of 1893—in case an extension of this agreement should be made with the company after the present year.

The company are to provide a yard and adequate accommodation for the feeding of swine from the by-products of the Dairy Station.

I am, yours very truly,

JAS. W. ROBERTSON,
*Dairy Commissioner.*

The cream was collected from the farmers of the surrounding country, and the largest part of the butter was shipped to Great Britain. Some of it was sold during my stay in England in December. The butter market during the latter part of that month and early in January was rather dull, owing to the Christmas and New Year's holiday season. Expecting that the market would recover tone, I consented to have some of the butter held until on in January. The financial panic in Australia caused the banks which held the bills of lading for the small quantities of butter which reached England from that country to be hurried on the market in a panicky and timid manner. That was one of the factors which caused a very great drop in the butter market. That came before all the butter from the Kingsclear creamery was sold. As will be seen in the summary of the business there, a portion of it was sold for a low price; and (without admitting any neglect to do all that could be done to obtain the highest price for the butter), I added the sum of $84 to the net amount received from the last sales in order to make the returns to the patrons as satisfactory as possible under the unfortunate circumstances.

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The butter-making at Kingsclear is being continued during the season of 1893, with the prospect of a considerably higher return to the patrons per pound of butter manufactured.

A winter butter-making station was commenced at Sussex, N.B., where the cheese factory premises had been fitted up with the necessary butter-making apparatus and conveniences. Details of this business will be found in the summary in Part IX., and in the report of Mr. J. W. Hart.

A programme of work for the diffusion of information upon butter-making at private dairies, upon the further extension of co-operative dairying at cheese factories and creameries, and upon the growth of Indian corn for cured fodder and ensilage, was undertaken under the joint management of the Provincial Department of Agriculture and the Dairy Commissioner for the Dominion. During part of the time, five different experts were employed. The expenses of these were met by the Provincial Government, and the official reports of their work have been sent to the Secretary of Agriculture for New Brunswick. The work was conducted in the main satisfactorily and successfully during the year, with evident advantage to the farmers in those branches of their business which are connected with cattle and dairying.

### *Report of Mr. J. W. Hart (New Brunswick).*

1. Mr. Hart reports upon the work at Kingsclear creamery, which was opened on the 15th of June, 1892. A summary of the business will be found in Part IX.

2. On November 22nd he took charge of the winter butter-making station at Sussex, N.B.

3. He delivered an address before the Convention of the Farmers and Dairymen's Association, at Fredericton, in January. He has presented a report of the address on "The Essentials to Success in Co-operative Dairying."

4. He gives a report of the business at Sussex, N.B., of which a statistical summary will be found in Part IX.

I regret that Mr. Hart gave up his situation in our *Dairying Service* to accept one in connection with an Experimental Station and Agricultural College in the United States. During his short stay in New Brunswick, he gained the confidence of the farmers and did excellent work in promoting the dairy interests of the province.

### *Mr. W. W. Hubbard's Report (New Brunswick).*

Mr. Hubbard succeeded Mr. Hart in charge of the Kingsclear Dairying Station. He had been employed during the previous summer as one of the travelling dairy instructors, by the Provincial Government.

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## SUMMARY OF WORK IN THE PROVINCE OF NOVA SCOTIA.

Co-operative dairying is being gradually but slowly extended. Most of the cheese factories are located in the County of Antigonish and in Cape Breton. A few have been established in other parts of the province.

One of the cheese-making experts of my staff, Mr. J. E. Hopkins, acted as travelling instructor in dairying during the summer. He attended and addressed 27 meetings and made 54 visits of instruction and inspection to 18 cheese factories.

A Branch Experimental Dairy Station was established on a site at the Dominion Experimental Farm at Nappan, N. S. The buildings were erected by capital furnished by a few persons in the neighbourhood, our Department put in the apparatus for cheese-making, and will put in the apparatus for butter-making in the autumn of the present year. The following are sketches of the ground plan of the building which has been erected, with the several parts of the machinery in place, as shown on them:—

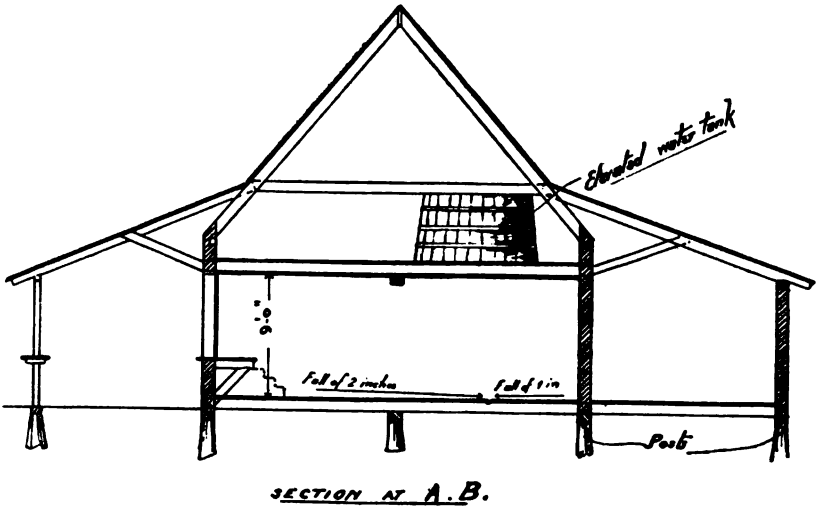


FIGURE I.—Showing a section of Figure II. at A, B, across the covered roadway, the working room and the boiler and engine room.

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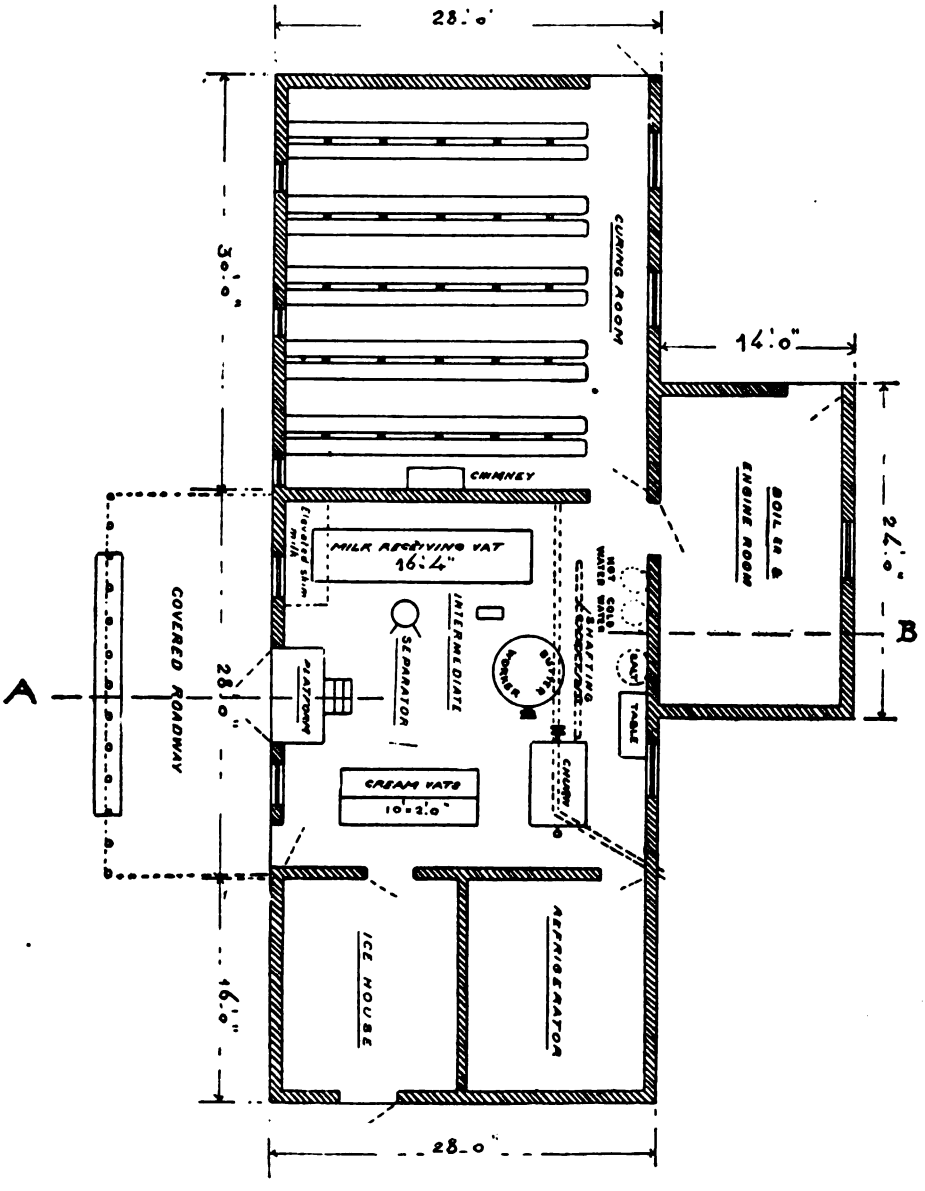


FIGURE II.—Showing the ground plan with the apparatus for making butter in place.

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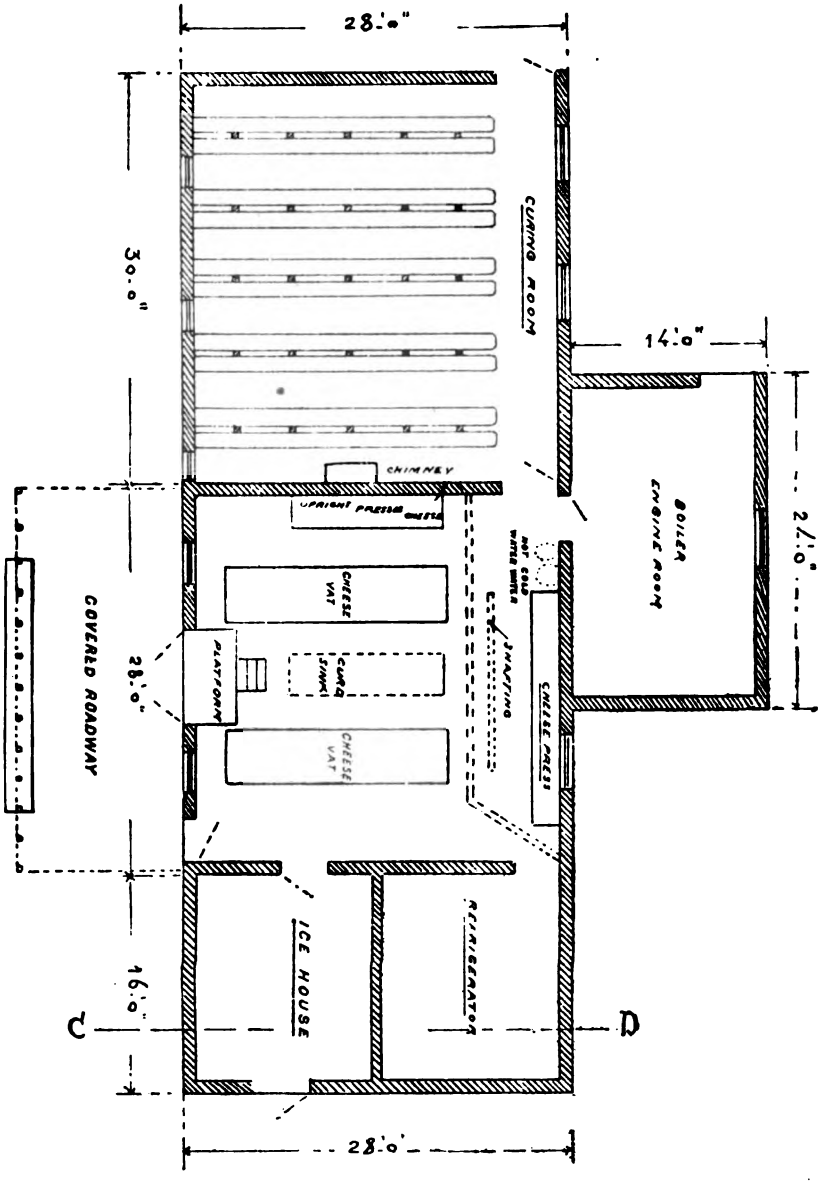


FIGURE III.—Showing the ground plan with the apparatus for making cheese in place.

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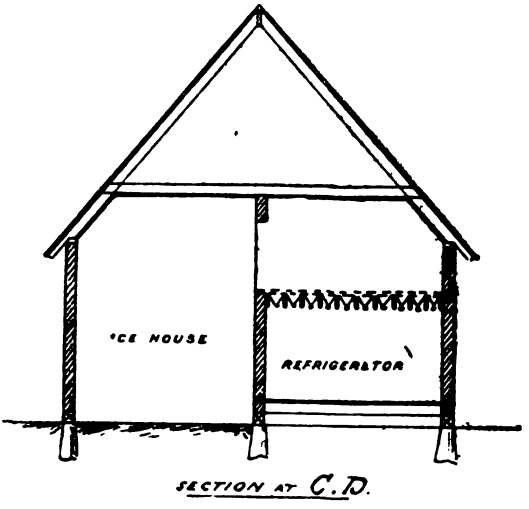


FIGURE IV.—Showing a section of Figure III. at C, D, across the ice house and refrigerator.

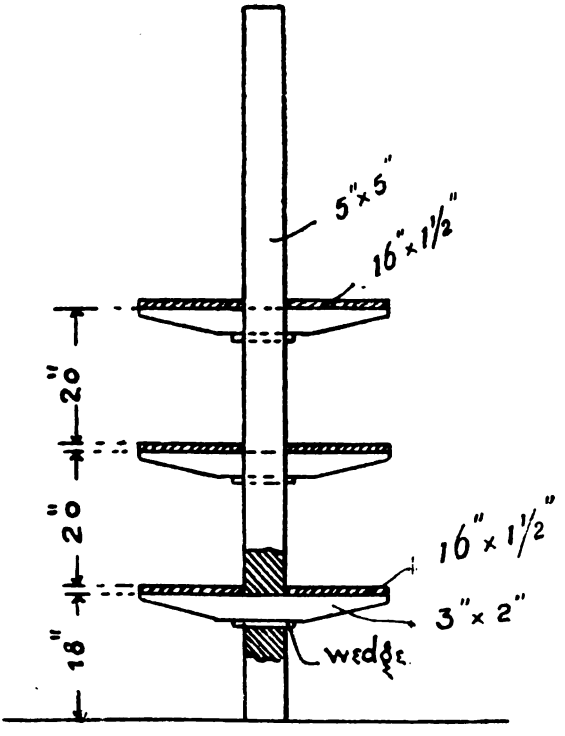


FIGURE V.—Showing the post, arms and ends of shelves for cheese in curing room.



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Cheese-making was commenced in June, 1893, and there is every prospect that this station will become a centre of influence and education in dairy matters for the province, which is admirably adapted for the production of large quantities of fine butter, cheese and condensed milk.

*Report of Mr. J. E. Hopkins (Nova Scotia).*

Mr. Hopkins arrived in Nova Scotia on the 30th of May, 1892. His object was to visit the cheese factories and give the makers and patrons practical information to aid them in carrying on their business.

2. He points out that the absence of succulent feed for milch cows during the winter is a serious drawback to successful dairying in both summer and winter.

3. He mentions that a favourable inclination on the part of the farmers is increasing.

4. He found 19 cheese factories in operation. He attended 27 meetings, which were attended by from 30 to 100 farmers each.

During the summer of 1893, Mr. Hopkins is in charge of the Experimental Dairy Station at Nappan, from which he will make occasional excursions into different parts of the province to visit cheese factories.

## SUMMARY OF WORK IN PROVINCE OF PRINCE EDWARD ISLAND.

During the course of my meetings in Prince Edward Island in 1891, I had intimated that, if the farmers would erect a suitable building for a Dairy Station, our Department would place the necessary machinery in it and run it as an Experimental Dairy Station. In 1891, there was no co-operative dairying on the Island, with the exception of one small cheese factory. The farmers in the vicinity of New Perth formed themselves into a joint stock company and agreed to erect a suitable building for cheese-making on a site which was selected on the farm of Mr. John Hamilton. At first the farmers were reluctant to supply milk, fearing that the venture would not prove successful. However, when the factory was opened, most of the farmers in the vicinity gave it hearty support. Particulars concerning the running of the business are given in the report of Mr. T. J. Dillon, and in the summary of the business in Part IX.

A portion of the cheese was shipped to Great Britain and was sold there at the same prices as were being realized for finest cheese from other parts of Canada at the same time. It was estimated that no less than 1,000 farmers visited the Dairy Station during the summer. In consequence, the farmers in many other districts decided to form joint stock companies, erect suitable buildings, and put in the necessary machinery and apparatus at their own expense, providing the Dairy Commissioner would undertake to manage the manufacturing business for them until they acquired sufficient knowledge and experience to carry it on successfully and satisfactorily themselves.

During the winter of 1892-93 and the spring of 1893, nine new cheese factories were erected and equipped by joint stock companies of farmers. I was authorized to manage these cheese factories upon terms somewhat similar to those which were

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extended to the patrons of the Experimental Dairy Station at New Perth. Unfortunately one new factory was burned before it passed under our care. The companies of farmers who owned two of the old cheese factories on the island made application to receive similar terms to those which were accorded to the owners and patrons of the new factories. This was granted, and 11 cheese factories are in operation during the summer of 1893 under my direction. Seeing that it would be quite impracticable to manage the milk drawing at so many factories from a central office in a manner satisfactory to the patrons, to the milk-drawers or to myself, it was decided to put the manufacturing charge at 1¼ cents per pound of cheese, leaving the patrons to engage such milk-drawers as were required.

Parliament had provided a sum of money to enable me to make advances at the end of every month up to two-thirds of the estimated value of the milk delivered. I was also permitted to make advances on account to the milk-drawers, until such time as the cheese are sold, when all such advances are to be fully refunded to the credit of the Receiver General.

The following is the form of the agreement which has been entered into between the several companies and myself:—

*Agreement with the Companies and Patrons.*

MEMORANDUM of agreement between James W. Robertson, Dairy Commissioner for the Dominion, and ..... .....in the matter of manufacturing cheese at ..... during the season of 1893.

1. On behalf of the..... (hereinafter called the company), it is agreed that the company shall provide convenient premises and a cheese factory, suitably equipped with all necessary apparatus and utensils for the manufacture of cheese.

2. On behalf of the company it is agreed that the cheese factory building and premises (equipped as stated in paragraph 1), shall be put under the control and direction of the Dairy Commissioner for the Dominion.

(*a.*) Any charge or claim on the premises or building on behalf of those persons who advance money for the erection and equipment of the building, or any other persons whatsoever, are not to be considered as claims upon the Dairy Commissioner or the Department of Agriculture.

3. On behalf of the directors and shareholders of the company, it is agreed that they shall use all reasonable means to promote the interests of the factory, and to secure patrons who will furnish a supply of milk.

4. On behalf of the company, it is agreed that the company, or the patrons of the factory, shall deliver the milk at the factory.

(*a.*) The whey is to be disposed of for the benefit of the patrons in such a way as may be agreed upon between the company and the patrons of the factory.

5. In consideration of the foregoing, the Dairy Commissioner agrees to manufacture from the milk which is received, a first-class quality of cheese at the manufacturing rate or charge of one and a quarter cents (1¼) per pound of cheese manufactured.

(*a.*) The right to reject any milk which he considers unfit for use in making first-class cheese, is reserved to the cheese-maker.

6. The Dairy Commissioner agrees to provide the fuel, cheese boxes and all other dairy furnishings which are necessary, and to care for the cheese until they are cured and fit for market.



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7. The Dairy Commissioner agrees to market the cheese to the best of his judgment and ability, and to pay to the several patrons, the net proceeds realized from all sales of cheese, after deducting the manufacturing charge of one and a quarter cents (1¼) per pound of cheese, and such a further charge as the company require for payment of the drawing of the milk from the milk-stands of the several patrons to the factory.

8. The Dairy Commissioner agrees to advance to the patrons, after the end of every month, such a sum on account as he may estimate to be about two-thirds of the net value of the milk.

9. The Dairy Commissioner agrees to insure the cheese against loss by fire, as trustee for and on behalf of the patrons, to the amount of two-thirds of their market value; but the factory buildings and the apparatus and utensils therein are to be insured by the company on their own behalf, and the Dairy Commissioner is to accept no responsibility in that connection.

10. The Dairy Commissioner agrees to keep the premises and machinery in a good state of repair, from ordinary wear and tear.

11. The Dairy Commissioner agrees to pay to the company a rent of....., (equal to ten per cent on the cost of the buildings and equipment), for the use of the factory and premises for the season of 1893.

Signed at..... .....this .....day of..... .....1893.

The following is the form of the agreement which I furnished in blank to the several companies for use in concluding the contracts with the several milk-drawers:—

*Agreement for the Drawing of Milk.*

This agreement made the day of one thousand eight hundred and ninety, , between of the first part (hereinafter called the ); and of the , in the County of and Province of Prince Edward Island, of the second part:

Witnesseth that the said party of the second part, in consideration of the covenants on the part of the party of the first part, doth covenant to and with the said party of the first part, that he will draw and deliver at the factory, according to the rules and regulations of the said , now made and provided, or which may hereafter be made and provided for, all the milk placed on the milk-stands during the season of on the milk route known as number commencing at milk-stand on the line, township of and following the said route to the said factory, and will handle and deliver the said milk at the time named in the said rules and regulations and will take all necessary care of and protect from injury all milk cans and return them to the milk-stands each day according to the said rules and regulations, and will be responsible for all damages caused by neglect of duties, improper care of milk and cans in the performance of the said work.

And it is further agreed between both parties to this agreement that the rate of remuneration for the said work for the current year shall be the sum of and that per cent of the said remuneration shall be retained by the said until the whole of the said work has been completed in accordance with the said regulations as security for the faithful performance of the said work; and in case of any default, neglect or want of care the whole or a sufficient part of the said per centage of remuneration retained may be forfeited in payment of any damages caused by such default, neglect or want of care, and it is further agreed that the

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balance of remuneration after it has been earned shall be paid to the party of the second part, by the party of the first part at any time or times during the season, as may be agreed upon between the parties to this agreement.

And it is further agreed that the party of the second part shall commence to draw milk on the day of and shall draw milk every week day, or the days that the manager for the said may appoint, up to the , when the said season shall close.

In witness whereof we have hereunto set our hands and seals this the day of , one thousand eight hundred and ninety- .

In the presence of } SEAL.

SEAL.

Mr. T. J. Dillon was the member of my staff who went to New Perth when the Dairy Station there was established in 1892. He managed the business well.

In the spring of 1893 he was charged with the duty of overseeing the work at the eleven cheese factories which were under our control. His headquarters were at Charlottetown, P.E.I. The management of business upon this comparatively large scale (amounting to between $40,000 and $50,000 during the four months of the summer in a district where it is new to most of the patrons), will require unceasing care; but when these factories have been successfully established (as I have no doubt they will be from the very commencement), they will give to the farmers of Prince Edward Island new opportunities for turning their farming resources to good account, with the advantage of beginning co-operative dairying at about the place to which the farmers of Ontario and Quebec have attained after twenty years of experience.

The following copy of a letter, which I sent to the several cheese-makers at the different factories, sets forth the spirit which it was desired should animate the efforts of all who were connected with this movement.

*Letter to Cheese-makers.*

MY DEAR SIR,—Your engagement as one of our cheese-makers identifies you with the introduction of co-operative dairying into Prince Edward Island at this time. In a large measure it is a new business there. Its immediate and permanent success will depend mainly upon:—

1. The profits to the farmers;

2. The development of the good feeling which already exists on the part of the farmers towards our Department and this business;

3. The hearty co-operation of the patrons of the factory of which you have charge.

With all of these you have more or less to do; and I am trusting you to shoulder the responsibility which belongs to the work at your factory with an untiring and unswerving determination to do the best you can.

As you know, the immediate direction and supervision of the factories in Prince Edward Island have been entrusted to Mr. Thos. J. Dillon, Dairy Superintendent for Prince Edward Island. I have full confidence in his ability; and I desire you to obey his instructions promptly and cheerfully.

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For your guidance and to bring out into use the best business capacity and power for work and management which you possess, I invite you to read the following suggestions on the three headings already mentioned, until you know them—not as commands or instructions—but as matters which you practise daily by your own choice and preference.

*Profits to the Farmers.*

1. The profits come from the difference between the cost of production and the price obtained for the product. Therefore, encourage every patron to keep the best of cows in the best way, at the lowest cost for feed. Lose no chance of learning and then pointing out to others the benefits from growing Indian corn for fodder. Indian corn, horse beans and sunflowers are a means for delivering dairy farmers from the yoke of hard times. Preach that gospel in season and out of season.

2. A good price for the cheese—the higher the better—will increase the profits. You cannot push the market price up or pull it down. The finest quality of cheese always fetches a higher price than goods of a common or poor quality. Let the cheese from your factory be faultlessly fine. Let your standard not be—"good enough to pass Mr. Dillon's or Prof. Robertson's inspection," but let it be—"as fine as they can be made."

3. To attain this will require painstaking care in every detail of the work. From the intrinsic quality and appearance of the cheese, to the condition of the factory floor and surroundings, let your aim be—"As well as it can be."

4. I will endeavour to get the highest price that can be got for the cheese. Give me no excuse for selling for a fraction of a cent less than the top market price, by turning out goods of fancy quality.

*The development of the good feeling which already exists on the part of the farmers towards our work and this business.*

1. In a measure you are the custodian of my reputation in the district and at the factory.

2. If the words or actions of some well-meaning but quick-tempered person should irritate you, keep control of your temper and preserve your courtesy of manner with a frank, firm civility, in order that you may act creditably for the department. If you want to get mad or feel a need of doing so, go to the woods and attend to it all alone after business hours.

3. I expect you to do all of your work and to attend to every part of your business so well, that as a cheese-maker and a business man you will merit the respect of every patron. When they respect you fully, our Department will be content with what runs over.

*The hearty co-operation of the patrons of the factory of which you have charge.*

1. Confidence is the basis of durable, desirable co-operation. Confidence in the business as a good one is contagious. Try to innoculate everybody with enthusiasm. Confidence in the fairness of the business is essential. Strict honesty of administration, fairplay to all alike, and the fact that the business is theirs—ours only for them—will foster co-operation.

I have not gone into the details of the work. Our monthly notes for cheese-makers and Mr. Dillon's directions from time to time will do that. The success of this business is of far-reaching importance to the province and to yourself. I have observed young men closely, and have some knowledge of the qualities which enable them to do the best with themselves and for themselves. Integrity, cheerfulness and

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diligence are a trio which I commend to you for bosom friends. The middle one is seldom valued as highly as it should be. If the outlook is dull after you have done your duty faithfully, try to get your liver in better order, take large doses of fresh air, and the world will lose its gloominess.

I attach a statement of the regulations which are to govern the competition for the gold medal and the silver medals which I offer—as a personal matter—to the patrons who furnish the largest supply of milk per cow.

I am, yours very truly,

JAS. W. ROBERTSON,
*Dairy Commissioner.*

REGULATIONS FOR MEDALS.

1. The total number of milking cows kept on the farm from which the milk is supplied are to be counted.

2. The total quantity of milk received at the factory from every patron, from the time when the factory opens, with the regular milk-drawers collecting the milk, until the close of the cheese-making season, is to be reckoned.

3. The one patron who supplies the largest quantity of milk per cow (as per clauses 1 and 2), taking in all the factories which are managed by the Dairy Commissioner in Prince Edward Island, will be entitled to a gold medal.

4. Every one of the patrons who severally furnish the largest quantity of milk per cow (as per clauses 1 and 2), to one of the other factories, will be entitled to receive a silver medal.

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Personally and officially, I am indebted to the officers of the several Dairying Companies, and particularly the President, Secretary and other officers of the New Perth Dairying Company, for the assistance which they have rendered in connection with our work in Prince Edward Island.

## *Mr. T. J. Dillon's Report (P.E.I.).*

2. During the winter of 1891–92, Mr. Dillon had charge of the Experimental Dairy Station at Mount Elgin, Ont. While there he attended meetings of farmers. and gave information on winter dairying, and other aspects of profitable farming.

2. In April, 1892, he started for Prince Edward Island. He first attended meetings in the school-houses in the district of New Perth, and secured the names of 34 farmers who agreed to become patrons of the new Dairy Station. Largely through his energetic efforts (this is not in his report), the numbers of patrons were quickly increased until over 100 farmers were supplying milk.

3. He reports on some of the work in connection with the cheese-making at New Perth, and explains the disposal of the whey.

4. After the cheese-making was finished, he attended meetings of farmers, advising the growing of larger areas of Indian corn, and the sowing of fall rye for feed during the summer. In Part XII. is a cut of a bunch of rye, which was grown on the Island during the summer of 1892.

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5. On November 5th, he left for Mount Elgin, Ont., to take charge of the winter butter-making station there. He reports upon that business, and mentions a number of persons who learned butter-making under his supervision.

6. He attended eleven annual meetings of the companies and patrons of cheese factories, after which he left for Prince Edward Island, to take charge of the eleven cheese factories to be run there during the summer.

## SUMMARY OF THE WORK IN THE PROVINCE OF MANITOBA AND THE NORTH-WEST TERRITORIES.

In 1892, Mr. Robert Cornett, from my staff, visited different districts, addressed meetings of farmers upon dairy topics, and gave practical illustrations of butter-making. He also visited the cheese factories.

I was able to attend several meetings in the province of Manitoba. A report of an address which I delivered before the annual meeting of the Central Farmers' Institute of Manitoba, at Portage la Prairie, will be found in Part VI.

A Dairymen's Association for the North-west Territories was organized at Regina. The question of establishing a co-operative creamery upon a large scale, with branch separating stations at different points, from which cream could be collected to the central manufacturing premises, was brought forward at the meeting, and pressed upon the attention of the public afterwards. An effort was made to have a company formed to engage in this enterprise, with headquarters at Moose Jaw. Considerable correspondence ensued between several of the promoters and myself in reference to this matter. I did not consider it prudent to encourage the scheme as presented by its promoters, as, in my opinion, the country is not yet ready to support successfully such a venture. The following letters which I wrote to the President of the Dairymen's Association of the North-west Territories, and to Mr. Wm. Watson, set forth the attitude which I maintained towards that movement, and also my opinion as to the plan according to which co-operative dairying can be promoted most advantageously in the North-west.

OTTAWA, 3rd February, 1893.

A. C. THORBURN, Esq.,
President, N. W. T. Dairymen's Association,
Broadview, N.W.T.

MY DEAR SIR,—Your letter of the 5th December has been here awaiting my return. I have read the address which Mr. Watson delivered before the Convention at Regina with a good deal of interest. I fear that settlement in the North-west is not yet dense enough, nor the railway facilities sufficiently regular with low rates of freight, to make his project likely to succeed at present. In old settlements where cows are several times more plentiful than they are yet in the North-west, that central factory scheme has been a doubtful success. The difficulty of getting the cream to the central factory at regular times, the difficulty of returning the empty milk or cream cans, and the cost connected therewith, and the difficulty of satisfying the farmers who are many miles distant from the creamery and who never come in contact with the manager or the butter-maker, are probably greater than any saving that would be effected in the actual outlay required for the labour of manufacturing the butter. It occurs to me also that there is another difficulty to overcome in the

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neighbourhood of Moose Jaw and Regina; that is, the scarcity of cold, pure water, which is essential to the raising of cream at home, so as to secure the largest quantity in good condition.

I have given the needs of your district of Canada a good deal of consideration recently, and I submit the following for your consideration. Would it not be the better plan for the farmers of the North-west, for half a dozen or ten farmers, who could keep from ten to twenty cows each, to join together, provide a small creamery building, fit it up with a centrifugal cream separator, deliver their own milk at the factory every morning, and take the skim milk home with them? This would do away with the expense of hauling the milk or cream long distances, and would provide the skim milk in the best condition for the raising of calves or the feeding of swine. I know there are not many men yet in the North-west who keep as many as fifteen or twenty milking cows; but a method, such as I have suggested, might be the best means of encouraging them to increase their herds, when they can see an economical way of manufacturing butter and disposing of it. I hope to give effect to a scheme somewhat like this at some point in the North-west during the coming summer, in addition to the work of travelling instruction, which we we expect also to continue.

I am, yours very truly,

JAS. W. ROBERTSON.

OTTAWA, 16th March, 1893.

WM. WATSON, Esq., Moose Jaw, N.W.T.

MY DEAR SIR,—I have received your letter of the 25th ult., and also a copy of *The Times* of Moose Jaw, N. W. T., containing the open letter which you have addressed to me and the people of Assiniboia through its columns. Absence from home at conventions in Ontario and Quebec has prevented me from answering you sooner.

You express some misgivings about how I may view your action in publishing my letter addressed to the President of the North-west Dairymen's Association. I assure you that I have not any objection to the course which you took, and I believe it was taken for the purpose of promoting the welfare of the farmers. However, I may be permitted to suggest that you read the letter itself, as I do not find in it any of the plans, theories or statements which you have discovered there, and have demolished with such evident satisfaction.

The gist of the whole matter—when divested of the unnecessary, and therefore unbecoming controversial quality with which you raiment it in print—appears to me to be :—

I propose that the farmers of the North-west Territories should begin co-operative dairying, mainly in butter-making and the rearing of stock, in such an inexpensive and economical way as they can best afford under the conditions of the sparse settlement which exist. The means and methods of co-operation which may be adopted must be adapted to the peculiar needs and conditions of the country in relation to water supply, temperature, cattle population, &c., &c.

In a country of recent settlement it seems to me desirable to permit each farmer to do as much of the work as is practicable and economical, in order that he may earn for himself what would otherwise go to pay some one else. For that reason it occurs to me that the task of delivering milk from six, or ten, or even twenty farms, to a creamery, and carrying the skim milk home, would not be unremunerative labour for some helper on the farms. If one of half a dozen neighbours undertook to draw the milk for all the others one day a week by turns, the co-operative element would have larger application.

One of the young men or young women from one of the farm homes might soon learn to make gilt-edged creamery butter; (and we have it in view to provide

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an opportunity in Assiniboia where they can do so during the coming summer). No such wages as $75 per month need be reckoned on at the beginning of the business upon a small scale; and I may remind you that nearly all the great and good conveniences which exist for and minister to the prosperity of the people came from small beginnings.

I agree with you that the sooner the farmers of the North-west Territories turn their attention to the mixed farming on the well-watered areas, the better will it be with them in every sense; and I am desirous and ambitious to render them such aid as our Department can give towards attaining success in that direction. Do you not think that most of the closed creameries and idle cheese factories in the western part of the Dominion, owe their failure to the fact that they were full-sized as to expenditure from the beginning, from being started on a scale too large for the cattle population of the localities which they were intended to serve?

It is not difficult to perpetrate an alluring prospectus of a concern gigantic enough to own and operate the whole earth as an adjunct of Heaven,—or of Moose Jaw or Regina; but it might be not so easy to run the business so as to realize on the expectations and money which might be invested in it. On the other hand, if the people of Moose Jaw and its vicinity will go in for establishing and equipping a small creamery adapted to the needs of their locality, I believe it will pay the promoters and will be a means of great benefit to the farmers who furnish milk or cream. I do not see any advantage from burdening the scheme for a creamery at Moose Jaw, by proposals to establish branch cream separating stations in the surrounding territory, until after the central creamery is a workable and working success. If I can help you to reach that first goal, I shall gladly do so.

I am, yours very truly,

JAS. W. ROBERTSON.

Afterwards it was decided to erect a creamery at Moose Jaw, by way of making a beginning in the co-operative business. One of my assistants was sent to Moose Jaw to give information and to personally supervise for a time the placing of the machinery and apparatus. Owing to the late date at which the creamery was completed and owing to the fact that some of the prospective patrons were not ready to furnish as much milk as was looked for, the opening of the creamery has to be postponed for the present season.

An expert butter-maker was placed during part of the summer at Wolseley, to act as instructor in butter-making to all who should visit the station.

It appears to me that if a dozen or more farmers in the North-west Territories would convey the milk from their herds to one central farm, where a small dairy building could be erected, they would find it both economical and profitable to have the butter made at one central place by an expert butter-maker. A centrifugal cream separator would separate the cream and leave the skim milk ready to be carried home in the same cans with a detention of not more than a quarter or half an hour. It was with the object of calling attention to the feasibility and suitability of this method of dairying to North-west conditions, that one of my assistants was sent to Wolseley for the present summer of 1893.

During the winter of 1892-93, a request was made to the Department on behalf of the Dairymen's Association of the Province of Manitoba, that an expert from the Dairy Commissioner's staff be sent to give instruction to the cheese-makers of the province at the different factories. It was represented to me by the President of

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the Dairymen's Association of the Province of Manitoba, that other provision would be made for giving assistance to the butter-makers of the province in that branch of the business. It has been arranged that Mr. C. C. Macdonald visit the cheese factories in Manitoba.

### *Mr. Robert Cornett's Report (Manitoba).*

1. Mr. Cornett gives a statement of his work in general terms and mentions the number and nature of the meetings which he attended and of the cheese factories which he visited.

2. He reports his opinions and impressions concerning the cows, pasture, water, cheese factories and creameries of Manitoba.

3. He visited cheese factories in the province of Ontario, to give to intending exhibitors information concerning the arrangement and plans which had been made for receiving cheese for the exhibition at the World's Fair.

### MEETINGS AND LECTURES.

The Order in Council by which I was appointed Dairy Commissioner, intimates that one main object and sphere of my work is to give practical information to farmers and others by means of bulletins, conferences and lectures. Executive work which has arisen from the establishment and management of the Branch Experimental Dairy Stations—(there have been 19 different dairy stations under my control during the year)—has absorbed a large share of my time; the management of the exhibition of Canadian dairy products at the World's Fair, claimed no few hours of it; my trip to Great Britain appropriated nearly two months; the planning and supervising of work at the dairy on the Central Experimental Farm and investigations into the feeding and management of cattle and swine in my capacity as Agriculturist, received but a scanty portion, considering their importance; and meetings of farmers, correspondence, etc., etc., had to go sparingly served by what was left of it. I have alluded to these matters to account for the smaller number of meetings which I have found it possible to attend than in former years. Since January 1st, 1892, I have been able to deliver addresses at 53 conventions or meetings of farmers and dairymen. These were held in the provinces of Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island and Manitoba. My assistants also gave addresses upon 322 occasions. The nature of the proceedings at these meetings is referred to in their several reports in this volume. I attach much importance to the holding of meetings of and with the farmers. For my own benefit, it affords me sincere pleasure to take part in them. The occupation of farming is one which tends to make those who follow it, take a rather gloomy and despondent view of the outlook for the future of their business. The intensity of new competitions and difficulties become appalling to men who labour most of the time in isolation; and most men retain enough of the herding proclivities of the race to find a renewal of courage in joining a number of their fellows in any effort for the amelioration of their condition. Public meetings of farmers help to imbue them with a spirit of mental activity, which leads in well-balanced men to hopefulness, courage, intelligence and thoroughness in work. For the sake of the subtle, strong and wholesome influence on themselves (and on their products and profits) which comes from frequent meetings to discuss with sincerity and unselfishness, the affairs of

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their own calling—threefold trade, business and profession—I cherish the hope that farmers will not forsake the assembling of themselves together, but will rather multiply their meetings and make them continually more helpful and enjoyable. As the subject matter of some of the addresses which I had the honour to deliver during the year, may be useful to many farmers whom the voice of one speaker cannot hope to reach, I have introduced the reports of those which I gave before the Central Farmers' Institute of Manitoba at Portage la Prairie, before the Central Farmers' Institute of Ontario at Toronto, before the Ensilage and Economic Stock-feeding Association at Montreal, and before the Agricultural Congress at Quebec. Under the heading of my mission to Great Britain, I have put the reports of addresses delivered in Liverpool and London, England.

The dairy bulletins which were issued during the year, were mainly for the guidance of cheese-makers. The experimental investigations at the dairy of the Central Experimental Farm have been chiefly for the benefit of butter-makers. The bulletins and reports are in this volume.

The particulars of the investigations which were carried on at the Central Experimental Farm in my capacity as Agriculturist, were reported upon in the annual report of the Experimental Farms. These bear directly upon dairy work, and as the report has been stereotyped, it can be transferred into this volume with little expense and some advantage to dairymen.

The volume of trade from Canada in the exports of butter and cheese is shown by the following tables (years ended 30th June) :—

DOMINION OF CANADA—Exports of Dairy Products—Home Production.

BUTTER.

| Year. | Quantity. | Value. | To Great Britain. | To United States. | To France. | To Germany. | Other Foreign Countries. | B.N.A. Provinces. | British Indies. |
|---|---|---|---|---|---|---|---|---|---|
| | Lbs. | $ | $ | $ | $ | $ | $ | $ | $ |
| 1868.... | 10,649,733 | 1,698,042 | 544,707 | 1,015,702 | ..... | 1,496 | 14,870 | 95,777 | 26,986 |
| 1880.... | 18,535,362 | 3,058,069 | 2,756,064 | 111,158 | ..... | ..... | 24,710 | 163,290 | 2,847 |
| 1881.... | 17,649,491 | 3,573,034 | 3,333,419 | 58,522 | ..... | ..... | 30,574 | 143,935 | 6,584 |
| 1882.... | 15,161,839 | 2,936,150 | 2,195,127 | 529,169 | ..... | ..... | 32,052 | 169,270 | 10,538 |
| 1883.... | 8,106,447 | 1,705,817 | 1,330,585 | 206,154 | ..... | ..... | 29,446 | 131,341 | 8,291 |
| 1884.... | 8,075,537 | 1,612,481 | 1,395,652 | 46,618 | ..... | ..... | 16,455 | 151,224 | 2,532 |
| 1885.... | 7,330,788 | 1,430,905 | 1,212,768 | 16,795 | ..... | 15,172 | 21,473 | 161,862 | 2,835 |
| 1886.... | 4,668,741 | 832,355 | 652,863 | 17,545 | ..... | ..... | 17,577 | 142,485 | 1,885 |
| 1887.... | 5,485,509 | 979,126 | 757,261 | 17,207 | ..... | ..... | 23,789 | 180,238 | 631 |
| 1888.... | 4,415,381 | 798,673 | 614,214 | 13,468 | ..... | ..... | 5,226 | 164,329 | 1,436 |
| 1889.... | 1,780,765 | 331,958 | 174,027 | 7,879 | ..... | ..... | 22,921 | 124,349 | 2,782 |
| 1890.... | 1,951,585 | 340,131 | 184,105 | 5,059 | ..... | ..... | 29,342 | 119,989 | 1,636 |
| 1891.... | 3,768,101 | 602,175 | 440,060 | 10,054 | ..... | 20,447 | 24,021 | 101,649 | 5,944 |
| 1892.... | 5,786,696 | 1,056,058 | 877,455 | 6,038 | ..... | 5,160 | 27,207 | 133,770 | 6,428 |
| 1893.... | 7,036,013 | 1,296,814 | 1,118,614 | 7,539 | ..... | 1,175 | 35,042 | 127,412 | 7,032 |

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DOMINION OF CANADA—Exports of Dairy Products—Home Production—*Continued.*

CHEESE.

| Year. | Quantity. | Value. | To Great Britain. | To United States. | To France. | To Germany. | Other Foreign Countries. | B. N. A. Provinces. | British Indies. |
|---|---|---|---|---|---|---|---|---|---|
| | Lbs. | $ | $ | $ | $ | $ | $ | $ | $ |
| 1868.... | 6,141,570 | 620,543 | 548,574 | 68,784 | .. . ... | ..... | 891 | 1,954 | 340 |
| 1880.... | 40,368,678 | 3,893,366 | 3,772,769 | 114,507 | .... .. | .. ..... | 170 | 5,710 | 210 |
| 1881.... | 49,255,523 | 5,510.443 | 5,471,362 | 28,500 | ..... | .. . .... | 14 | 10,027 | 540 |
| 1882.... | 50,807,049 | 5,500,868 | 5,471,676 | 18,436 | ..... | .... .... | 242 | 8,196 | 2 318 |
| 1883.... | 58,041,387 | 6,451,870 | 6,409,859 | 24,468 | ..... | .. .. .... | 202 | 15,480 | 1,863 |
| 1884.... | 69,755,423 | 7,251,989 | 7,207,425 | 24,866 | . . .. | .... ..... | 188 | 19,248 | 262 |
| 1885.... | 79,655,367 | 8,265,240 | 8,178,953 | 68,978 | ..... | .. .... | 205 | 15,899 | 1,207 |
| 1886.... | 78,112,927 | 6,754,626 | 6,729,134 | 15,478 | 80 | 90 | 156 | 9,139 | 549 |
| 1887.... | 73,604,448 | 7,108,978 | 7,065,983 | 30,667 | ..... | ..... | 211 | 11,982 | 165 |
| 1888.... | 84,173,267 | 8,928,242 | 8,834,997 | 83,153 | 5 | ..... | 828 | 9,087 | 172 |
| 1889.... | 88,534,887 | 8,915,084 | 8,871,205 | 31,473 | .... ... | ..... | 1,582 | 11,208 | 216 |
| 1890.... | 94,260,187 | 9,372,212 | 9,349,731 | 6,425 | ..... | 370 | 2,154 | 12,777 | 755 |
| 1891... | 106,202,140 | 9,508,800 | 9,481.373 | 13 485 | .... .. | ..... ... | 1,954 | 9,104 | 2,884 |
| 1892.... | 118,270,052 | 11,652.412 | 11,593,690 | 39,558 | 2 | ..... | ... .... | 12,942 | 4,096 |
| 1893.... | 133,946,365 | 13,407,470 | 13,360,237 | 24,578 | ..... .. | .. .. .... | ..... | 18,669 | 2,297 |

The following table, from the Board of Trade returns of Great Britain for seven years (ended 31st December), shows the total quantities and values of butter and cheese imported into Great Britain, and illustrates the possible extension of our exports, particularly in fresh-made butter during the winter season :—

| BUTTER. | | | CHEESE. | | |
|---|---|---|---|---|---|
| Year. | Quantity. | Value. | Year. | Quantity. | Value. |
| | Cwts. | £ | | Cwts. | £ |
| 1886 ..... | 1,543,566 | 8,141,438 | 1886 .. ..... ... .... | 1,734,890 | 3,871,359 |
| 1887 ..... | 1,513,134 | 8,010,374 | 1887 .. ..... .. .... | 1,836,789 | 4,514,382 |
| 1888 ..... .. ... .... | 1,671,433 | 8,913,045 | 1888..... | 1,917,616 | 4,546,408 |
| 1889 . .. ..... .... .. | 1,927,842 | 10,244,636 | 1889..... | 1,907,999 | 4,490,970 |
| 1890 ..... .. ..... | 2,027,717 | 10,598,848 | 1890..... ... ..... | 2,144,074 | 4,975,134 |
| 1891 ..... | 2,135,607 | 11,591,181 | 1891..... ..... | 2,041,317 | 4,815,369 |
| 1892..... ..... ..... | 2,183,009 | 11,965,190 | 1892..... ..... | 2,232,817 | 5,416,784 |

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In order to make the information which it contains as easily available as possible to those who may consult its pages, the remainder of this report is arranged into parts under the following headings :—

Part I.—The Feeding of Steers.
" II.—The Fattening of Swine.
" III.—Experimental Dairy Work.
" IV.—Forty-Acre Lot.
" V.—Dairy Bulletins.
" VI.—Lectures and Addresses.
" VII.—Mission to Great Britain.
" VIII.—Miscellaneous Matters.
" IX.—Summary of Business at the Experimental Dairy Stations.
" X.—Canadian Dairy Products at the World's Columbian Exposition.
" XI.—Report of the Assistant Dairy Commissioner.
" XII.—Reports of Superintendents of Experimental Dairying.

ACKNOWLEDGMENTS.

The newspapers of Canada have been our invaluable co-workers in the effort to lay before the farmers such information and suggestions as might prove helpful to them in their work and lives. I may be permitted to overlook the impersonal character of the press and to mention that my thanks are due to the many journalists in all parts of Canada, whose brightness, breadth, clearness and catholicity of thought, in the matter of what is good for the people, have led them to include many items of news on dairy topics in the columns, which are becoming more and more every year the foremost and most forceful of educational agencies touching the material, social and intellectual well-being of the community.

Yearly I find myself under a deeper sense of gratitude, to the officers and members of the Farmers' and Dairymen's Associations and of Farmers' Institutes, and to the many hundreds of whole-souled, warm-hearted men and women on the farms of Canada, for the kindnesses which they have loaded upon me in a personal and official capacity.

The ultimate issue, as to real usefulness, of much of the work which is undertaken by the *Dairying Service*, depends in a large measure upon the diligence, integrity and efficiency of my assistants. Particularly taxing and difficult tasks have been entrusted during the year to Messrs. J. A. Ruddick, Thos. J. Dillon and J. W. Ellerby; and I take this opportunity of commending their untiring devotion to their duties and the uncommon quality and value of the services which they have rendered.

I have the honour to be, sir,
Your obedient servant,
JAS. W. ROBERTSON,
*Dairy Commissioner.*

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## PART I.—THE FEEDING OF STEERS.

Experiments in the fattening of steers were begun at the Central Experimental Farm in December, 1890. The main object of the first experiments, was to obtain information upon the relative cost of fattening steers, (1) upon a ration of which the bulky-fodder portion was mainly corn ensilage, hay and roots, (2) upon a ration of which the bulky-fodder portion was mainly hay and roots, and (3) upon a ration of which the bulky-fodder portion was mainly corn ensilage.

Six 2-year-old steers were purchased and were sorted into three lots, as nearly even in quality and size as possible. They were apparently all Shorthorn grades. On 1st December the average weight per head was 1,135 lbs. During the test (which lasted from 1st December to 18th May), they were weighed once every week and the feed they consumed was weighed every day. They had free access to water in a trough in front of the stalls, and a supply of salt was provided at the side of each manger. The preparatory period of feeding lasted from 1st December to 29th December, and during it all the animals were fed upon the same ration.

The three experimental rations were composed as shown in the following Table:—

TABLE I.

| Ration No. 1. | Lbs. | Ration No. 2. | Lbs. | Ration No. 3. | Lbs. |
|---|---|---|---|---|---|
| Corn ensilage | 20 | | | Corn ensilage | 50 |
| Hay (cut) | 10 | Hay (cut) | 20 | | |
| Roots | 20 | Roots | 40 | | |
| Straw (cut) | 5 | Straw (cut) | 5 | Straw (cut) | 5 |
| Oil-cake | 1 | Oil-cake | 1 | Oil-cake | 1 |
| Cotton-seed meal | 1 | Cotton-seed meal | 1 | Cotton-seed meal | 1 |
| Pease (ground) | 2 | Pease (ground) | 2 | Pease (ground) | 2 |
| Barley (ground | 2 | Barley (ground) | 2 | Barley (ground) | 2 |
| | 61 | | 71 | | 61 |

For a period of five weeks from the 17th March to the 20th April, an additional 1 lb. each of oil-cake and cotton-seed meal were put into each ration.

For the purpose of obtaining some data which would be understood easily and remembered readily by the farmers, and which would afford means for making a comparison between the cost of feeding the steers on the three different rations, a cash value was estimated for the component fodders in each. The hay was valued at $8 per ton; roots (turnips and mangels) at $4 per ton; straw at $4 per ton; oil-cake and cotton-seed meal at $30 per ton; pease and barley at $20 per ton; and corn ensilage at $1.40 per ton. The corn ensilage was placed at the actual cost, as per statement in Bulletin No. 12, and the other fodders at an estimated valuation, which may be high or low, according to ever fluctuating circumstances of seasons and markets.

Table II shows, (1) the increase in weight of each steer after 20 weeks, (2) the average quantity of feed consumed per day per head, and (3) the average cost per head per day for feed consumed.

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TABLE II.

| RATIONS. | Increase in weight. | Feed consumed. | Cost per head per day |
|---|---|---|---|
| | lbs. | lbs. | cents. |
| No. 1. Hay, roots, corn ensilage and meal | 128 | 52·8 | 15·58 |
| No. 1. do | 182 | | |
| No. 2. Hay, roots and meal | 188 | 55·5 | 19·23 |
| No. 2. do | 179 | | |
| No. 3. Corn ensilage and meal | 221 | 60· | 11·90 |
| No. 3. do | 212 | | |

*Conclusions.* From these tests it appears that:—

(1.) During the feeding period of 20 weeks, the steers which were fed upon ration No. 3, (corn ensilage and meal), gained in weight, on the average, 33 lbs. per head more, and cost 7·33 cents per head less, per day for feed consumed, than the steers which were fed upon ration No. 2, (hay, roots and meal);

(2.) During the feeding period of 20 weeks, the steers which were fed upon ration No. 3, (corn ensilage and meal), gained in weight, on the average, 61½ lbs. per head more, and cost 3·68 cents per head less, per day for feed consumed, than the steers which were fed upon ration No. 1, (hay, roots, corn ensilage and meal);

(3.) When the experiment was ended, the steers which were fed upon ration No. 2, (corn ensilage and meal) were in the most attractive condition of the three lots for handling and selling;

(4.) A ration of which the bulky-fodder portion was mainly corn ensilage, was more profitable for the fattening of steers, than a ration of which the bulky-fodder portion was mainly or wholly hay and roots.

### EXPERIMENTS IN 1891–92.

The experiments in the feeding of steers during the winter of 1891–92, were planned,—

(1.) To obtain further information upon the relative cost of fattening steers upon a ration of which the bulky-fodder portion was mainly, (*a*) in the one case, corn ensilage, hay and roots, (*b*) in another case, hay and roots, and (*c*) in the third case, corn ensilage,—

(2.) To discover the comparative values of feed consumed, per 100 lbs. of increase in live weight, by 3-year-old steers, 2-year-old steers, 1-year-old steers and calf-steers respectively.

### THE FATTENING OF TWO-YEAR-OLD STEERS.

Eight 2-year-old steers were purchased and were sorted into four lots as nearly even in quality and size as possible. They were apparently all Shorthorn grades.

The preparatory feeding period lasted from October 29 to December 1, and during it the animals were all fed upon the following ration:—

| | Lbs. |
|---|---|
| Corn ensilage | 25 |
| Roots | 50 |
| Straw (cut) | 15 |
| Pease (ground) | 3 |
| Barley (ground) | 3 |
| | 96 |

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They were each allowed as much of the mixture as they would eat.

On October 29 the average weight per head was 1,079 lbs., and on December 1 it was 1,155 lbs., showing a gain of 76 lbs. per head.

Three rations were composed as in Table III.

TABLE III.

| Ration No. 1. | Lbs. | Ration No. 2. | Lbs. | Ration No. 3. | Lbs. |
|---|---|---|---|---|---|
| Corn ensilage | 20 | | | Corn ensilage | 50 |
| Hay (cut) | 10 | Hay (cut) | 20 | | |
| Roots | 20 | Roots | 40 | | |
| Straw (cut) | 5 | Straw (cut) | 5 | Straw (cut) | 5 |
| Oil-cake | 2 | Oil-cake | 2 | Oil-cake | 2 |
| Pease (ground) | 2 | Pease (ground) | 2 | Pease (ground) | 2 |
| Barley (ground) | 2 | Barley (ground) | 2 | Barley (ground) | 2 |
| | 61 | | 71 | | 61 |

For the purpose of making a comparison of the relative cost of fattening steers upon the three different rations, a cash value was estimated for the component fodders in each. The hay was valued at $8 per ton; roots at $4 per ton; straw at $4 per ton; oil-cake at $30 per ton; pease and barley at $20 per ton; and corn ensilage at $2 per ton. The corn ensilage was valued at a higher figure than in the former experiment (in 1890–91) for the reason that the corn was wilted to a greater extent before it was put into the silos, and because it cost more in 1891 than in 1890 owing to the crop being damaged by a hail storm in August. The prices at which the several fodders are valued for the purposes of this comparison are higher than the cost of production to the ordinary farmer, and may be higher or lower than the prices which could be realized from their sale as fodders.

The following Table shows, (1) the increase in weight of each steer in 18 weeks' (2) the total quantity of feed consumed on the average per head per day, (3) the average quantity of the meal mixture (included in the former) consumed per head per day, and (4) the average cost per head per day, for feed consumed.

TABLE IV.

| RATIONS. | Increase in weight. | Feed consumed per head. | Meal in feed per day. | Cost per head per day. |
|---|---|---|---|---|
| | lbs. | lbs. | lbs. | cents. |
| No. 1. Hay, roots, corn ensilage and meal | 152 | 61·96 | 6·09 | 18·28 |
| No. 1. do do | 265 | | | |
| No. 2. Hay, roots and meal | 165 | 53·92 | 4·55 | 18·22 |
| No. 2. do | 213 | | | |
| No. 3. Corn ensilage and meal | 260 | 67·92 | 6·68 | 14·47 |
| No. 3. do | 229 | | | |



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THE FATTENING OF STEERS ON CORN ENSILAGE AND FROZEN WHEAT.

From December 1 until January 5, the other two steers were fed upon a ration composed of—

| | Lbs. |
|---|---|
| Corn ensilage | 50 |
| Straw (cut) | 5 |
| | 55 |

During that period, they gained in weight an average of 11 lbs. per head, and consumed on the average 61·9 lbs. of feed per head per day, at a cost of 6·75 cents per head per day.

From January 5 until April 5, these two steers were fed upon a ration composed of,

| | Lbs. |
|---|---|
| Corn ensilage | 50 |
| Straw (cut) | 5 |
| Frozen wheat (ground) | 6 |
| | 61 |

During that period of 13 weeks, they gained in weight an average of 159 lbs. per head, and consumed on the average 59·88 lbs. of feed per head per day, at a cost of 9·32 cents per head per day. The frozen wheat was valued at 35 cents per bushel.

Table V shows, (1) the average increase in weight per head per day, (2) the average cost per head per day for feed consumed, and (3) the average cost of feed consumed per 100 lbs. of increase in live weight.

TABLE V.

| RATIONS. | Increase in weight per day. | Cost per head per day. | Cost per 100 lbs. increase in weight. |
|---|---|---|---|
| | lbs. | cents. | $ |
| No. 1. Hay, roots, corn ensilage and meal | 1.65 | 18·28 | 11 06 |
| No. 2. Hay, roots and meal | 1·50 | 18·22 | 12 14 |
| No. 3. Corn ensilage and meal | 1·94 | 14·47 | 7 45 |
| No. 4. Corn ensilage and frozen wheat | 1·74 | 9·32 | 5 33 |

*Conclusions.* From these tests it appears that:—

(1.) During the feeding period of 18 weeks, the steers which were fed upon ration No. 3 (corn ensilage and meal), gained in weight on the average 55½ lbs. per head more, and cost 3·75 cents per head less, per day for feed consumed, than the steers which were fed upon ration No. 2 (hay, roots and meal);

(2.) During the feeding period of 18 weeks, the steers which were fed upon ration No. 3 (corn ensilage and meal), gained in weight on the average 36 lbs. per head more, and cost 3·81 cents per head less, per day for feed consumed, than the steers which were fed upon ration No. 1 (hay, roots, corn ensilage and meal);

(3.) The cost for feed consumed per 100 lbs. of increase in live weight, was 62·95 per cent greater on ration No. 2 (hay, roots and meal), and 48·32 per cent greater on ration No. 1 (hay, roots, corn ensilage and meal) than it was on ration No. 3 (corn ensilage and meal);

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(4.) On ration No. 2 (hay, roots and meal) the quantity of meal consumed per head per day, was 4·55 lbs. as against 6·68 lbs. per head per day on ration No. 3 (corn ensilage and meal);

(5.) The quality of the beef, from the steers fed upon corn ensilage and frozen wheat, was pronounced to be particularly excellent by the butchers, and by the members of eight different households who examined it critically when served as roast beef.

NOTE.—To furnish further data for a comparison between the bulky-fodder portions of rations Nos. 1, 2 and 3, an equal quantity of meal per head per day, will be fed to the several animals in our next series of experiments, instead of equal quantities of meal being added to the different rations.

### THE FEEDING OF THREE-YEAR-OLD STEERS.

Four 3-year-old steers were purchased and were sorted into two lots of apparently even quality. On December 3, the operation of dehorning was performed on them. The wounds on the heads of three of the animals appeared to be acutely painful for about a week, and during that time they all lost from 40 to 100 lbs. each. The other animal did not seem to suffer much, after the operation of sawing off the horns was ended. After the wounds were healed, the animals were fed loose in a cold shed with only one thickness of lumber between them and the outside air.

The preparatory feeding period lasted from October 29 to December 1, and during it the animals were all fed upon the following ration:—

| | Lbs. |
|---|---|
| Corn ensilage | 25 |
| Roots | 50 |
| Straw (cut) | 15 |
| Pease (ground) | 3 |
| Barley (ground) | 3 |
| | 96 |

They were each allowed as much of the mixture as they would eat.

On October 29, the average weight per head was 1,182 lbs.; and on December 1, it was 1,251 lbs.,—showing a gain of 69 lbs. per head.

Two rations were composed as in Table VI.

TABLE VI.

| Ration No. 3. | Lbs. | Ration No. 5. | Lbs. |
|---|---|---|---|
| Corn ensilage | 50 | Corn ensilage | 50 |
| Straw (cut) | 5 | Straw (cut) | 5 |
| Oil-cake | 2 | | |
| Pease (ground) | 2 | | |
| Barley (ground) | 2 | | |
| | 61 | | 55 |

For the purpose of making a comparison, a cash value was estimated for each of the component fodders in each ration as mentioned after Table III, page 33.



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The following Table shows, (1) the increase in weight of each steer in 18 weeks, (2) the quantity of feed consumed on the average per head per day, (3) the quantity of the meal mixture (included in the former) consumed per head per day, and (4) the average cost per head per day, for feed consumed.

TABLE VII.

| RATIONS. | Increase in weight. | Feed consumed. | Meal in feed per day. | Cost per head per day. |
|---|---|---|---|---|
| | lbs. | lbs. | lbs. | lbs. |
| No. 3. Corn ensilage and meal | 102 | 65·96 | 6·48 | 14·05 |
| No. 3. do do | 155 | | | |
| No. 5. Corn ensilage | 50 | 54·65 | 0 | 5·96 |
| No. 5. do | 7 | | | |

THE FEEDING OF ONE-YEAR-OLD STEERS.

Four 1-year-old steers were purchased and were sorted into two lots of apparently even quality.

The preparatory feeding period lasted from 29th October, to 1st December, and during it, the animals were all fed upon the following ration:—

| | Lbs. |
|---|---|
| Corn ensilage | 25 |
| Roots | 50 |
| Straw (cut) | 15 |
| Pease (ground) | 3 |
| Barley (ground) | 3 |
| | 96 |

They were each allowed as much of the mixture as they would eat.

On 29th October, the average weight per head was 751 lbs.; and on 1st December, it was 805 lbs.; showing a gain of 54 lbs. per head.

From 1st December until 5th April, both lots were fed upon ration No. 3:—

| | Lbs. |
|---|---|
| Corn ensilage | 50 |
| Straw (cut) | 5 |
| Oil-cake | 2 |
| Pease (ground) | 2 |
| Barley (ground) | 2 |
| | 61 |

The two steers of one lot, were fed loose in a cold shed with only one thickness of lumber between them and the outside air; and the two steers of the other lot, were fed tied in stalls in the cattle stable. The average temperature of the stable would be about 50° Fahr.

The following Table shows, (1) the increase in weight of each steer in 18 weeks, (2) the quantity of feed consumed on the average, per head per day, (3) the quantity of the meal mixture (included in the former) consumed per head per day, and (4) the average cost per head per day, for feed consumed.

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TABLE VIII.

| RATIONS. | How fed. | Increase in weight. | Feed consumed per head. | Meal in feed per head. | Cost per head per day. |
|---|---|---|---|---|---|
| | | lbs. | lbs. | lbs. | cents. |
| Corn ensilage and meal | In stable. | 173 | 45·25 | 4·45 | 9·64 |
| do | do | 163 | | | |
| do | In shed. | 172 | 43·94 | 4·32 | 9·36 |
| do | do | 129 | | | |

*Conclusion.* From this single test, it is not evident that there was an appreciable difference in the increase in the weight of the steers, or in the quantity of feed consumed, which was due to the place or manner of feeding,—stable *v.* shed, and tied *v.* loose.

THE FEEDING OF CALF-STEERS.

Four calf-steers were put under test on rations Nos. 2 and 3. Each lot contained one steer, out of a grade Shorthorn cow by a Shorthorn bull, and one steer out of a "Quebec Jersey" or "French Canadian" cow. The breeding of the sire of the Quebec steers was not known to us.

The preparatory feeding period lasted from October 29 to December 1, and during it the animals were all fed upon the following ration :—

| | Lbs. |
|---|---|
| Corn ensilage | 25 |
| Roots | 50 |
| Straw (cut) | 15 |
| Pease (ground) | 3 |
| Barley (ground) | 3 |
| | 96 |

They were each allowed as much of the mixture as they would eat.

On October 29, the average weight per head was 465 lbs.; and on December 1, it was 526 lbs., showing a gain of 61 lbs. per head.

The two rations were composed as in Table IX.

TABLE IX.

| Ration No. 2. | Lbs. | Ration No. 3. | Lbs. |
|---|---|---|---|
| Hay (cut) | 20 | Corn ensilage | 50 |
| Roots | 40 | | |
| Straw (cut) | 5 | Straw (cut) | 5 |
| Oil-cake | 2 | Oil-cake | 2 |
| Pease (ground) | 2 | Pease (ground) | 2 |
| Barley (ground) | 2 | Barley (ground) | 2 |
| | 71 | | 61 |

For the purpose of making a comparison, a cash value was estimated for each of the component fodders in each ration, as mentioned after Table III, page 33.

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The following Table shows, (1) the increase in weight of each steer in 18 weeks, (2) the quantity of feed consumed on the average per head per day, (3) the quantity of the meal mixture (included in the former) consumed per head per day, and (4) the average cost per head per day, for feed consumed.

TABLE X.

| RATIONS. | Breed. | Increase in weight. | Feed consumed per head. | Meal in feed per head. | Cost per head per day. |
|---|---|---|---|---|---|
| | | lbs. | lbs. | lbs. | cents. |
| No. 2 { Hay, roots and meal. .... | Shorthorn..... | 255 | 30·71 | 2·59 | 10·38 |
| do ..... | Quebec. . ... .... | 164 | | | |
| No. 3 { Corn ensilage and meal... | Shorthorn ..... | 212 | 35·25 | 3·46 | 7·51 |
| do ... | Quebec ..... | 175 | | | |

The following Tables have been arranged to show, (1) the relative rates of increase in weight, (2) the relative cost per head per day, and (3) the relative cost of feed consumed per 100 lbs. of increase in live weight, of the steers of Shorthorn and Quebec blood respectively.

TABLE XI.

| — | Breed. | Weight Dec. 1. | Weight April 5. | Increase. |
|---|---|---|---|---|
| | | Lbs. | Lbs. | Lbs. |
| Steer No. 174..... | Shorthorn.. ..... | 595 | 850 | 255 |
| do 173 .. .... . ..... | Quebec..... .... .... | 480 | 644 | 164 |
| do 172 .. . ..... ..... | Shorthorn..... | 600 | 812 | 212 |
| do 171 ..... | Quebec..... .... .... | 430 | 605 | 175 |

TABLE XII.

| RATIONS. | Breed. | Increase in weight per day. | Feed consumed per day. | Cost per head per day. | Cost per 100 lbs. of increase in weight. |
|---|---|---|---|---|---|
| | | lbs. | lbs. | cents. | $ |
| No. 2 { Hay, roots and meal..... | Shorthorn ..... | 2·02 | 35·85 | 12·11 | 5·99 |
| do ..... | Quebec. . ..... | 1·30 | 25·65 | 8·67 | 6·66 |
| No. 3 { Corn ensilage and meal.. | Shorthorn ..... | 1·68 | 39·00 | 8·31 | 4·94 |
| do ... | Quebec..... .... | 1·38 | 31·50 | 6·71 | 4·83 |

*Conclusions.* From these tests with calf steers it appears that:—

(1.) During the feeding period of 18 weeks, the steers which were fed upon ration No. 3 (corn ensilage and meal) GAINED in weight on the average 16 lbs. per head LESS, and cost 2.87 cents per head LESS per day for feed consumed, than the steers which were fed upon ration No. 2 (hay, roots and meal);

(2.) The *cost* of feed consumed per 100 lbs. of increase in live weight, was 27.6 *per cent greater*, on ration No. 2 (hay, roots and meal), than it was on ration No. 3 (corn ensilage and meal);

(3.) The *cost* of feed consumed per 100 lbs. of increase in weight was *lowest* in the case of a calf steer of "French Canadian" or "Quebec Jersey" breed, fed upon ration No. 3 (corn ensilage and meal).

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COMPARISONS IN THE FEEDING OF STEERS OF DIFFERENT AGES.

In the foregoing Tables some information has been given showing the comparative quantities of feed consumed and the cost per 100 lbs. of increase in live weight, by 3-year-old steers, 2-year-old steers, 1-year-old-steers and calf-steers respectively, when fed upon the same ration.

The following additional Tables have been arranged to present a comparison of the results in convenient form. The lots which are compared were fed from Dec. 1 to April 5, upon ration No. 3, viz.:—

| | Lbs. |
|---|---|
| Corn ensilage | 50 |
| Straw (cut) | 5 |
| Oil-cake | 2 |
| Pease (ground) | 2 |
| Barley (ground) | 2 |
| | 61 |

TABLE XIII.

| Steers. | Increase in weight. | Increase in weight per day per head. | Feed consumed per day per head. | Meal in feed per day per head. | Cost per head per day. | Cost per 100 lbs. of increase in weight. |
|---|---|---|---|---|---|---|
| | lbs. | lbs. | lbs. | lbs. | cents. | $ |
| 3-year-old, No. 189 | 102 | 1·02 | 65·96 | 6·48 | 14·05 | 13·77 |
| do No. 188 | 155 | | | | | |
| 2-year-old, No. 183 | 260 | 1·94 | 67·92 | 6·68 | 14·47 | 7·45 |
| do No. 182 | 229 | | | | | |
| 1-year-old, No. 178 | 173 | 1·33 | 45·25 | 4·45 | 9·64 | 7·23 |
| do No. 177 | 163 | | | | | |
| Calf steer, No. 172 | 212 | 1.53 | 35·25 | 3·46 | 7·51 | 4·89 |
| do No. 171 | 175 | | | | | |

*Conclusions.* From this one series of experiments, it appears that :—

(1.) The *cost* for feed consumed per 100 lbs. of increase in live weight was *lowest* in the case of calf-steers, viz.: $4.89 per 100 lbs.;

(2.) The *cost* for feed consumed per 100 lbs. of increase in live weight was 84·83 *per cent greater* by the 3-year-old steers than by the 2-year-old steers;

(3.) The original weight of the 2-year-old steers was enhanced *in value per lb.*, quite as much by the feeding for 18 weeks, as was the original weight of the 3-year-old steers;

(4.) The original weight of the 1-year-old steers and calf-steers was not enhanced *in value per lb.* to any appreciable extent by the feeding for 18 weeks.

NOTES.—The 1-year-old steers and calf-steers have been carried over to be fed during the winter of 1892-93.

The corn ensilage, which was used in these experiments, was made from several varieties of Indian corn, most of which had not reached the early milk stage of growth. By the planting of varieties of corn which ripen early (mainly Longfellow and Pearce's Prolific) a quality of ensilage which appears to be much superior, has been provided for the feeding experiments of 1892-93.

## PART II.—THE FATTENING OF SWINE.

Experiments in the feeding of swine were commenced at the Central Experimental Farm in December, 1890. Particulars of the different sorts of feed, of the quantities of feed consumed, and of the increase in the live weight of the animals under the tests, were given in the Annual Report for 1891.

The objects of these first investigations were,—(1) to discover the difference, if any, in the quantity of grain required to produce every pound of increase in the live weight of the swine, when it was fed steamed and warm, and when it was fed raw

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and cold, (2) to obtain a record of the comparative quantities of grain required to produce every pound of increase in the live weight of swine during different stages of the fattening period.

The mixture of grain used in the tests was one composed of equal parts of pease, barley and rye, which had been ground. It was saturated with water and fed wet in all cases.

Cold water was given to drink, and a mixture of salt and wood ashes was put in a box on the floor of every pen, where the pigs had access to it at will.

The quantities of feed consumed were weighed every day, and the swine were weighed once every week.

The following Table shows the quantities of feed consumed per pound of increase in live weight, during six feeding periods in four pens.

TABLE I.

| — | PEN 1. | PEN 2. | PEN 5. | | PEN 6. | |
|---|---|---|---|---|---|---|
| | 4 Swine, fed steamed and warm. | 4 Swine, fed raw and cold. | 4 Swine, fed steamed and warm, plus Sugar Beets. | | 4 Swine, fed raw and cold, plus Sugar Beets. | |
| | Grain. | Grain. | Grain | Sugar Beets | Grain | Sugar Beets |
| | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. |
| December 9 to January 5 | 3·31 | 3·30 | 4·69 | 0·61 | 3·17 | 0·84 |
| January 5 to February 2 | 3·07 | 3·07 | 2·46 | 2·00 | 2·76 | 2·23 |
| February 2 to March 2 | 3·79 | 4·43 | 3·46 | 2·00 | 3·81 | 2·32 |
| March 2 to March 30 | 5·00 | 7·07 | 5·40 | 3·63 | 3·15 | 2·13 |
| March 30 to April 27 | 7·06 | 5·68 | 4·88 | 4·08 | 9·51 | 8·25 |
| April 27 to May 18 | 8·53 | 5·71 | 4·17 | 3·31 | 6.58 | 6·00 |
| Average | 4·16 | 4·25 | 3·86 | +2·46 | 3·89 | +2·73 |

*Conclusions.* These two sets of experiments indicate that:—

(1.) There is no appreciable difference in the number of pounds of grain required to produce a pound of increase in the live weight of swine, when it is fed steamed and warm, as compared with it when fed raw and cold;

(2.) On the average there is a gradual and great increase in the quantity of grain consumed for every pound of increase in the live weight of swine, after the second month of the fattening period, and after the average live weight exceeds 100 lbs.;

(3.) It is economical to market swine to be slaughtered when they weigh from 180 to 200 lbs., live weight;

(4.) The consumption of feed per day is *greatest* at or near the period of their fattening, when the quantity of feed consumed per pound of increase in weight, is *smallest.*

It may be added that to produce an increase of 3,231½ lbs. in the live weight of 24 swine, 4·14 lbs. of a mixture of equal parts of ground pease, barley and rye were required for every pound of increase in the live weight.

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EXPERIMENTS IN FEEDING GRAIN, UNGROUND, GROUND AND WITH SKIM-MILK.

During the winter of 1891–2 experiments were begun to discover the effect of feeding swine upon a ration of grain only (unground and ground) as compared with a ration composed of grain and skim-milk. For the purpose, four pens of pigs were selected and sorted into lots as nearly alike as they could be obtained. In each of the four pens were put two pigs out of a Poland-China sow by an improved Large Yorkshire boar. With them were put three grade pigs in each of the three first pens; and in the fourth pen two pigs out of a Berkshire sow by an Improved Large Yorkshire boar, were put with the two cross-bred Poland-China-by-Yorkshire pigs.

The 9 grade pigs which were put in the first three pens with the 6 cross-bred Poland-China-by-Yorkshire pigs, were purchased outside. Their breeding was not known, but they appeared to be grades of Chester White, or Yorkshire blood. The pigs in the several pens, considered as lots, were as nearly as practicable equal as to breeding, quality, age and size.

The experiment began on January 4th and ended on May 2nd. The feed consumed was weighed every day, and the swine were weighed once every week. The following Tables have been arranged to show the average results at four different times in the fattening period.

TABLE II.

Pen 1 contained 5 swine, as described above—3 grades and 2 cross bred Poland-China-by-Yorkshire. They were fed upon a mixture of equal parts of pease, barley and rye, *not ground*, and soaked in cold water for 48 hours.

| — | Jan. 1. | Feb. 1. | Feb. 29. | Mar. 28. | May 2. | Totals. |
|---|---|---|---|---|---|---|
| | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. |
| Live weight | 346 | 386 | 502 | 646 | 780 | ..... |
| Increase in weight | ..... | 40 | 116 | 144 | 134 | 434 |
| Feed consumed | ... ... | 378 | 490 | 544 | 538 | 1,930 |
| do per lb. of increase in live weight | .. .... | 9·49 | 4·13 | 3·77 | 4·01 | 4·45 |

TABLE III.

Pen 2 contained 5 swine similar to those in Pen 1. They were fed upon a mixture of equal parts of pease, barley and rye, *ground* and soaked in cold water for 12 hours.

| — | Jan. 4. | Feb. 1. | Feb. 29. | Mar. 28. | May 2. | Totals. |
|---|---|---|---|---|---|---|
| | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. |
| Live weight | 346 | 430 | 580 | 741 | 865 | ..... |
| Increase in weight | .. ..... | 84 | 150 | 161 | 124 | 519 |
| Feed consumed | .... ... | 461 | 572 | 657 | 576 | 2,266 |
| do per lb. of increase in live weight | ..... | 5·48 | 3·81 | 4·08 | 4·64 | 4·36 |

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TABLE IV.

Pen 3 contained 5 swine similar to those in Pens 1 and 2. They were fed upon an allowance of the same mixture as those in Pen 2 (viz.: equal parts of pease, barley and rye, *ground* and soaked in cold water for 12 hours), plus all the skim-milk they would drink.

| — | Jan. 4. | Feb. 1. | Feb. 29. | Mar. 28. | May 2. | Totals. |
|---|---|---|---|---|---|---|
| | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. |
| Live weight | 346 | 434 | 590 | 768 | 1,017 | ..... |
| Increase in weight | ..... | 88 | 156 | 178 | 249 | 671 |
| Feed consumed. Meal | ..... | 230 | 286 | 432 | 704 | 1,652 |
| Feed consumed. + Milk | ..... | 1,081 | 2,078 | 2,649 | 3,537 | 9,345 |
| do per lb. of increase in live weight. Meal | ..... | 2·61 | 1·83 | 2·42 | 2·82 | 2·46 |
| do per lb. of increase in live weight. + Milk | ..... | 12·28 | 13·32 | 14·88 | 14·20 | 13·92 |

TABLE V.

Pen 4 contained 4 swine, 2 crossbred Poland-China-by-Yorkshire, and 2 crossbred Berkshire-by-Yorkshire. They were fed upon an allowance of the same mixture as those in Pens 2 and 3, (viz., equal parts of pease, barley and rye, *ground* and soaked for 12 hours), plus all the skim-milk they would drink.

| — | Jan. 4. | Feb. 1. | Feb. 29. | Mar. 28. | May 2. | Totals. |
|---|---|---|---|---|---|---|
| | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. |
| Live weight | 306 | 395 | 520 | 675 | 842 | ..... |
| Increase in weight | ..... | 89 | 125 | 155 | 167 | 536 |
| Feed consumed. Meal | ..... | 332 | 385 | 514 | 626 | 1,857 |
| Feed consumed. + Milk | ..... | 610 | 481 | 551 | 938 | 2,580 |
| do per lb. of increase in live weight. Meal | ..... | 3·73 | 3·07 | 3·31 | 3·74 | 3·46 |
| do per lb. of increase in live weight. + Milk | ..... | 6·85 | 3·84 | 3·54 | 5·61 | 4·81 |

*Conclusions.* From these tests which continued 17 weeks, it appears that:—

(1.) 4·45 lbs. of grain were consumed per lb. of increase in live weight, when it was fed *unground* and soaked for 48 hours;

(2.) 4·36 lbs. of grain were consumed per lb. of increase in live weight, when it was fed *ground* and soaked for 12 hours;

(3.) 1 lb. of grain was the equivalent of 6·65 lbs. of skim-milk in increasing the live weight;

(4.) The swine, which were fed upon a ration containing skim-milk, were lustier and more robust in appearance, than those which were fed upon grain only.

EXPERIMENTS IN FEEDING FROZEN WHEAT.

The first test in this series was undertaken to discover, (1) what results could be obtained from the fattening of large-sized swine upon a ration of frozen wheat, and, (2) how frozen wheat compared with a mixture of equal parts by weight of pease, barley and wheat for increasing the live weight of the animals.

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Twelve grade swine were purchased; their age and breeding were not known. The average weight at the commencement of the test was 186 lbs. each. They were sorted into three lots, which were nearly even as to weight, quality and appearance.

The frozen wheat was procured from the branch Experimental Farms at Brandon, Man., and Indian Head, N.W.T. It was graded "No. 2 frozen," "No. 3 frozen," and "unmarketable."

TABLE VI.

Pen 1 contained 4 swine. They were fed upon frozen wheat *ground* and soaked in cold water for 12 hours.

| — | Dec. 28. | Jan. 25. | Feb. 22. | Mar. 14. | Totals. |
|---|---|---|---|---|---|
| | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. |
| Live weight | 739 | 847 | 969 | 1,100 | ..... |
| Increase in weight | ..... | 108 | 122 | 131 | 361 |
| Feed consumed | ..... | 701 | 650 | 565 | 1,916 |
| do per lb. of increase in live weight | ..... | 6·49 | 5.33 | 4·28 | 5.30 |

TABLE VII.

Pen 2 contained 4 swine. They were fed upon frozen wheat, *unground* and soaked for an average of 42 hours. (During the first 2 weeks of the test, the wheat was soaked for only 12 hours; that may account for the unusually large quantity consumed per lb. of increase in weight).

| — | Dec. 28. | Jan. 25. | Feb. 22. | Mar. 14. | Totals. |
|---|---|---|---|---|---|
| | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. |
| Live weight | 745 | 784 | 958 | 1,091 | ..... |
| Increase in weight | ..... | 39 | 174 | 133 | 346 |
| Feed consumed | ..... | 697 | 945 | 640 | 2,282 |
| do per lb. increase in live weight | ..... | 17·87 | 5·42 | 4·81 | 6·59 |

TABLE VIII.

Pen 3 contained 4 swine. They were fed upon a mixture of equal parts by weight of wheat, barley and pease, *unground* and soaked for an average of 42 hours.

| — | Dec. 28. | Jan. 25. | Feb. 22. | Mar. 14. | Totals. |
|---|---|---|---|---|---|
| | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. |
| Live weight | 747 | 816 | 963 | 1,114 | ..... |
| Increase in weight | ..... | 69 | 147 | 151 | 367 |
| Feed consumed | ..... | 673 | 935 | 620 | 2,228 |
| do per lb. of increase in live weight | ..... | 9·75 | 6·36 | 4·10 | 6·07 |

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*Conclusions.* From these tests with heavy swine, it appears that:—

(1.) when the frozen wheat was fed, *ground* and soaked for 12 hours, 11·3 lbs. of increase in the live weight were obtained per bushel of wheat;

(2.) When the frozen wheat was fed *unground* and soaked for 12 and 42 hours, 9·1 lbs. of increase in the live weight were obtained per bushel of wheat;

(3.) When the frozen wheat is to be fed *unground*, it should be soaked for at least 42 hours;

(4.) Leaving out of the reckoning, the weeks during which the frozen wheat *unground*, and the mixture of wheat, barley and pease *unground*, were soaked for only 12 hours, 5·24 lbs. of frozen wheat were consumed per lb increase, and 5·22 lbs. of the mixture of wheat, barley and pease were consumed per lb. of increase in the live weight.

The second test in this series was made with younger and smaller swine to discover, (1) the quantity of frozen wheat consumed per lb. of increase in live weight, and (2) the quantity of skim-milk which would be the equivalent of a pound of frozen wheat in increasing the live weight of the swine.

TABLE IX.

Pen V contained 5 swine bred at the Experimental Farm; they were out of a Poland-China sow by an Improved Large Yorkshire boar. They were fed upon frozen wheat *ground* and soaked for 12 hours. During the last 3 weeks of the test, they were fed upon the lowest quality of frozen wheat only, which has been graded "unmarketable."

| — | Feb. 1. | Feb. 29. | Mar. 28. | May 2. | May 30. | Totals. |
|---|---|---|---|---|---|---|
| | Lbs. | lbs. | Lbs. | Lbs. | Lbs. | Lbs. |
| Live weight | 306 | 470 | 595 | 724 | 827 | ..... |
| Increase in weight | ..... | 164 | 125 | 129 | 103 | 521 |
| Feed consumed | ..... | 565 | 508 | 551 | 580 | 2,204 |
| do per lb. of increase in live weight | ..... | 3·44 | 4·06 | 4·27 | 5·63 | 4·23 |

TABLE X.

Pen VI contained 4 swine bred at the Experimental Farm; they were out of a grade Berkshire sow by an Improved Large Yorkshire boar. They were fed upon an allowance of frozen wheat, *ground* and soaked for 12 hours, plus as much skim-milk as they would drink.

| — | | May 2. | May 31. | June 27. | Totals. |
|---|---|---|---|---|---|
| | | Lbs. | Lbs. | Lbs. | Lbs. |
| Live weight | | 415 | 519 | *577 | ..... |
| Increase in weight | | ..... | 104 | 141 | 245 |
| Feed consumed | Wheat | ..... | 327 | 322 | 649 |
| | + Milk | ..... | 1,601 | 1,465 | 3,066 |
| do per lb. of increase in live weight | Wheat | ..... | 3·14 | 2·28 | 2·65 |
| | + Milk | ..... | 15·39 | 10·39 | 12·51 |

* 3 swine only.

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*Conclusions.* From these tests with swine weighing an average of 61 lbs. each in the one pen, and an average of 104 lbs. each in the other pen, it appears that:—

(1.) When the frozen wheat was fed *ground* and soaked for 12 hours, 14·18 lbs. of increase in the live weight were obtained, per bushel of wheat;

(2.) In the feeding of swine from an average weight of 61 lbs. each, until they reached an average weight of 145 lbs. each, 15·46 lbs. of increase in the live weight were obtained, per bushel of wheat;

(3.) 1 lb. of frozen wheat was the equivalent of 7·91 lbs. of skim-milk in increasing the live weight;

(4.) The swine which were fed upon a ration containing skim-milk were lustier and more robust in appearance, than those which were fed upon grain only.

---

The swine from Pens V and VI were slaughtered; and the hams, sides and shoulders were cured in pickle by an Ottawa pork-dealer and ham-curer. The bacon and hams were pronounced excellent in quality, by many who examined them and afterwards purchased them for their own tables.

The parts of one side, from a pig of the lot which were fattened upon frozen wheat exclusively, were sent for opinion to Wm. Davies, Esq., of the Wm. Davies Co., Limited, Toronto, who have one of the largest and best known establishments for the curing of swine products in Canada. The following is the sum of the verdict of Mr. Davies upon its quality:—

"It is excellent, rather too salt, but very rich and luscious. I consider it superior to hogs fed on peas alone. The complaint regarding pea-fed bacon in England, is that the lean is hard, and this is the case to some extent with the fat also. It would be well if farmers in Canada would mix the grain and grind it, then give it to the hogs with whey, butter-milk or skim-milk."

### GENERAL REMARKS.

In those parts of Canada, where a less or greater quantity of wheat may be injured by frost or other climatic conditions, the farmers should fortify their positions by providing means whereby to market, in the best way, this product which cannot be sold at paying prices in the form of grain. From 9·1 lbs. to 15·46 lbs. of increase in the live weight of swine have been obtained per bushel of frozen wheat consumed.

When swine are fetching 5 cents per lb. live weight, with an allowance of five per cent deducted for shrinkage, the frozen wheat fed under the least favourable of ordinary conditions, may realize 43¼ cents per bushel. At the same price for swine, the frozen wheat, fed under favourable conditions in the quality and age of the swine and the preparation of the feed, may realize 73·45 cents per bushel.

The conditions required for the profitable feeding of swine are (1) clean, dry, warm quarters protected from wind and draughts, (2) as much wholesome feed—if grain preferably *ground* fine—as they will eat clean, three times a day, and (3) free access to a mixture of salt and ashes, to soda, or to soil.

To meet the requirements of foreign markets, swine with lean meat are wanted; larger numbers of them should be fed and fattened during the summer months; and they should be sold alive by the farmer or feeder in order that they may be slaughtered at packing houses, where the carcases can be cut and cured in a uniformly satisfactory manner, suited to the prefer nces of different buyers.

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## PART III.—EXPERIMENTAL DAIRY WORK.

In the Experimental Dairy, the experiments which have been carried on far enough to be reported upon are:—

I. Experiments in the creaming of milk during every month of the year (1) by a centrifugal cream separator; (2) by the gravity or setting method in the use of deep setting pails in ice water; and (3) by the gravity or setting method in the use of shallow milk-pans;

II. Experiments in the creaming of milk and the making of butter from the milk of cows (1) which had been milking for periods exceeding 6½ months each, and (2) which had been milking for periods of less than 6½ months each;

III. Experiments in churning sweet cream at different temperatures;

IV. Experiments in the churning of cream after the addition to it of different percentages of water.

### I—*Experiments in the Creaming of Milk.*

A series of experiments was undertaken to obtain information upon the relative efficiency of three different methods of creaming milk, for every month of the year. The methods used were (1) an Alexandra centrifugal cream separator; (2) deep-setting shot-gun milk pails set in ice water, and (3) shallow milk-pans set on a table in a room of which the temperature was recorded. The milking cows in our herd comprised Shorthorns, Ayrshires, Holsteins, Jerseys, Devons, Quebec Jerseys, and Shorthorn grade cows. Fresh-calved cows came in from time to time during the year. Mixed milk from the herd was used in the tests; and the testing by each of the three methods lasted for a period of one week of every month.

The following Table shows the results which were obtained by the use of a No. 4 Alexandra cream separator, No. 8 size, during one week of every month.

TABLE I.

| — | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature of milk.. Fahr. | 98° | 98° | 98° | 98° | 95° | 95° | 98° | 98° | 98° | 98° | 98° | 98° |
| Speed of separator.... per minute | 7,000 | 7,200 | 7,200 | 7,200 | 7,200 | 7,200 | 7,200 | 7,200 | 7,200 | 7,500 | 7,500 | 7,200 |
| Milk per hour..... lbs. | 500 | 400 | 400 | 450 | 500 | 500 | 550 | 500 | 500 | 450 | 500 | 425 |
| Fat in milk...per cent. | 3·93 | 3·88 | 3·66 | 3·73 | 3·70 | 3·76 | 3·50 | 3·40 | 3·50 | 3·52 | 3·55 | 3·90 |
| Fat in skim-milk..... per cent. | 0·30 | 0·08 | 0·10 | 0·04 | 0·08 | 0·08 | 0·04 | 0·04 | 0·03 | 0·08 | 0·05 | 0·04 |
| Fat in butter-milk .... per cent. | 0·15 | 0.10 | 0·40 | 0·20 | 0·25 | 0·15 | 0·20 | 0·15 | 0·10 | 0·13 | 0·07 | 0·30 |
| Milk per lb. of butter.. lbs. | 23·89 | 22·78 | 24·45 | 23·44 | 23·31 | 23·09 | 25·48 | 25·46 | 25·46 | 24·94 | 24·40 | 22·06 |
| Butter per 100 lbs. of milk ..... ... lbs. | 4·19 | 4·39 | 4·09 | 4·27 | 4·29 | 4·33 | 3·92 | 3·93 | 3·93 | 4·01 | 4·10 | 4·55 |
| Butter per 100 lbs. of fat in milk.... .....lbs. | 106·60 | 113·02 | 111·75 | 114·37 | 115·93 | 115·18 | 112·13 | 115·54 | 112·20 | 113·88 | 115·43 | 116·22 |
| Fat in butter..per cent. | 87·53 | 86·76 | 86·31 | 86·19 | 85·63 | 84.99 | 87·85 | 85·33 | 88·20 | 85·80 | 85·42 | 84·61 |
| Fat not recovered..... per cent. | 6·69 | 1·94 | 3·55 | 1·43 | 2·50 | 2·11 | 1.50 | 1.41 | 1·04 | 2·29 | 1·40 | 1·66 |

The following Table shows the results which were obtained by setting the milk during one week of every month in shot-gun milk-pails in a tank of ice water. The pails were of the ordinary cylindrical shape and size, viz., 20 ins. by 8½ ins. The skimming was effected by the use of a cone-shaped skimmer; and enough of the skim milk was removed with the cream to ensure a complete recovery of the butter fat which had risen to the top. The milk in every case was set immediately after it was received from the stable and it was left for 22 hours in the ice water.

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TABLE II.

| — | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature of milk, when set .. Fahr. | 88° | 86° | 89° | 90° | 93° | 95° | 95° | 96° | 84° | 84° | 82° | 80° |
| Temperature of water.. Fahr. | 38° | 38° | 38° | 38° | 38° | 38° | 38° | 38° | 36° | 35° | 36° | 37° |
| Temperature of milk, when skimmed. Fahr. | 38° | 38° | 38° | 38° | 38° | 38° | 38° | 38° | 36° | 35° | 36° | 37° |
| Fat in milk...per cent. | 3·95 | 3·81 | 3·68 | 3·72 | 3.70 | 3·76 | 3·50 | 3.40 | 3·50 | 3·52 | 3·55 | 3·90 |
| Fat in skim-milk ... per cent. | 0·92 | 0·69 | 0·51 | 0·41 | 0·35 | 0·45 | 0·23 | 0·23 | 0·35 | 0 39 | 0·80 | 0·87 |
| Fat in butter-milk ... per cent. | 0·20 | 0·35 | 0·39 | 0·20 | 0.20 | 0·15 | 0·20 | 0·30 | 0·20 | 0 30 | 0·20 | 0·25 |
| Milk per lb. of butter. lbs. | 26·51 | 25·98 | 26·17 | 25·77 | 24.85 | 25·30 | 26·49 | 26·41 | 25.77 | 25·94 | 28·46 | 25·64 |
| Butter per 100 lbs. of milk. ..... lbs. | 3·77 | 3·85 | 3·82 | 3·88 | 4·02 | 3·95 | 3·77 | 3·79 | 3·88 | 3·85 | 3·51 | 3·90 |
| Butter per 100 lbs. of fat in milk... . lbs. | 96·48 | 101·01 | 103·83 | 104·35 | 108·75 | 105·11 | 107.84 | 111·39 | 110·86 | 109.57 | 99·03 | 100·00 |
| Fat in butter..per cent. | 84·42 | 83·27 | 83·90 | 86 41 | 84·14 | 85·42 | 87·01 | 83·73 | 82·28 | 81·99 | 82·35 | 81·79 |
| Fat not recovered..... per cent. | 19·39 | 15·88 | 12·34 | 9·76 | 8·49 | 10·22 | 6·16 | 6·74 | 8·79 | 10·16 | 18·44 | 18·20 |

The following Table shows the results which were obtained by setting the milk, during one week of every month, in shallow milk-pans. The pans were twelve inches in diameter and the milk was set in them to a depth of three inches. In every case, the milk was set immediately after it was received from the stable; and it was left for 22 hours before it was skimmed.

TABLE III.

| — | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature of milk, when set.....Fahr. | 88° | 86° | 89° | 90° | 93° | 95° | 95° | 96° | 84° | 84° | 82° | 80° |
| Temperature of room.. Fahr. | 60° | 60° | 58° | 55° | 60° | 70° | 72° | 65° | 45° | 45° | 48° | 50° |
| Temperature of milk, when skimmed. Fahr. | 60° | 60° | 60° | 56° | 60° | 70° | 73° | 66° | 45° | 45° | 48° | 50° |
| Fat in milk...per cent. | 3·98 | 3·81 | 3·68 | 3·72 | 3·70 | 3·76 | 3·50 | 3·40 | 3·50 | 3·52 | 3·55 | 3·90 |
| Fat in skim-milk .... per cent. | 0·72 | 0·53 | 0·40 | 0·58 | 0·48 | 0·41 | 0·32 | 0·40 | 0·45 | 0·47 | 0·50 | 0·55 |
| Fat in butter-milk .... per cent. | 0·30 | 0·35 | 0·35 | 0·20 | 0·15 | 0·15 | 0·20 | 0·15 | 0·20 | 0·30 | 0·15 | 0·20 |
| Milk per lb. of butter.. lbs. | 25·00 | 25 05 | 25·00 | 27·05 | 25·46 | 25·00 | 25·69 | 26·53 | 27·38 | 27·16 | 26·92 | 24·39 |
| Butter per 100 lbs. of milk..... lbs. | 4·00 | 3·99 | 4·00 | 3·70 | 3·93 | 4·00 | 3·89 | 3·77 | 3·65 | 3·68 | 3·71 | 4·1 |
| Butter per 100 lbs. of fat in milk ..... lbs. | 100·50 | 104·76 | 108·70 | 99·35 | 106·17 | 106·40 | 111·28 | 110·86 | 104·36 | 104·71 | 104·67 | 105·13 |
| Fat in butter..per cent. | 83·75 | 83·30 | 82·50 | 86 82 | 83·50 | 84·82 | 82·31 | 80·76 | 85·24 | 84·04 | 84·15 | 83·61 |
| Fat not recovered..... per cent. | 15·70 | 12·73 | 10·33 | 13·74 | 11·35 | 9·74 | 8·41 | 10·46 | 11·04 | 12·00 | 11·92 | 12·10 |

The percentages of butter-fat in the mixed herd milk were practically the same for the three several weeks of every month; the greatest difference being in January, when it was ·05 of one per cent of fat.

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The following charts have been prepared to show at a glance, the comparative results which were obtained from the three different methods.

CHART I.

NUMBER of pounds of Butter obtained per 100 pounds of Milk, from the three different methods of creaming, as per Tables I., II. and III.

Centrifugal cream separator, ——————
Deep-setting milk-pails, — — — —
Shallow milk-pans, . . . . . .

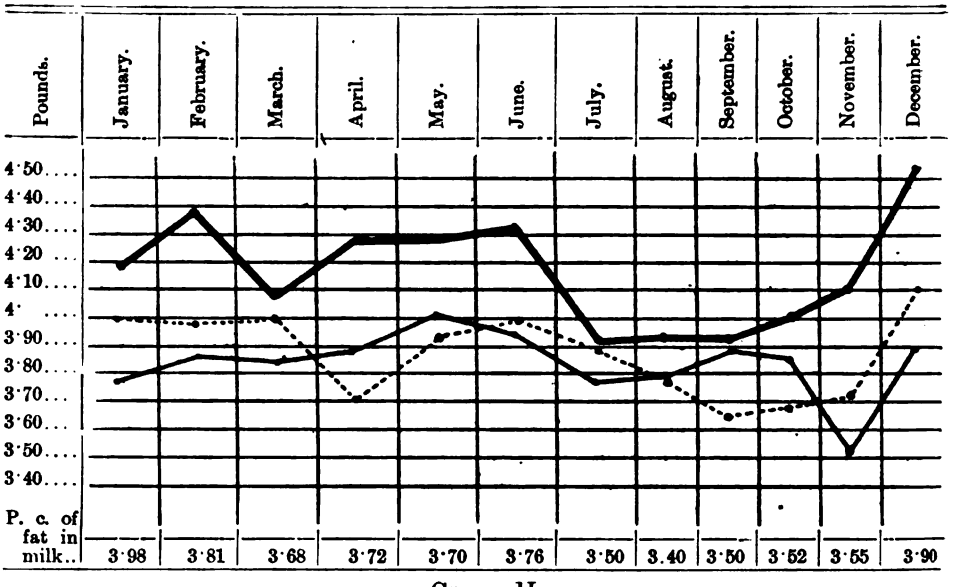


CHART II.

PERCENTAGE of Fat in Skim-milk, from the three different methods of creaming, as per Tables I., II. and III.

Centrifugal cream separator, ——————
Deep-setting milk-pails, — — — —
Shallow milk-pans, . . . . . .

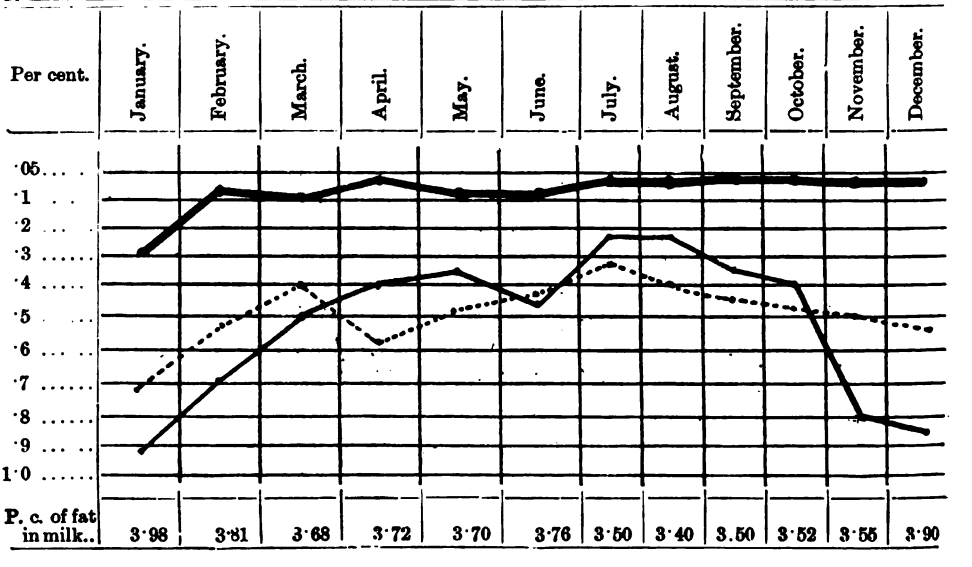


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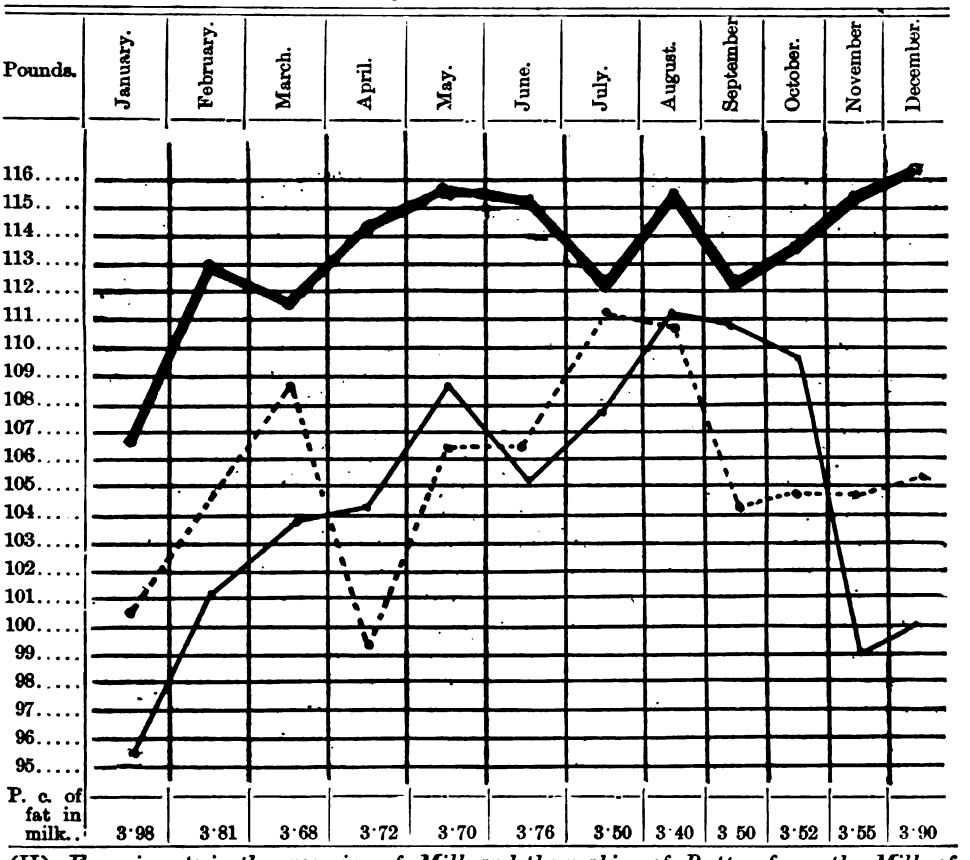
CHART III.

NUMBER of pounds of marketable Butter, obtained per 100 pounds of Butter fat in milk, from the three different methods of creaming, as per Tables I., II. and III.

Centrifugal cream separator, ——————
Deep-setting milk-pails, — — — —
Shallow milk-pans, .....




(II) *Experiments in the creaming of Milk and the making of Butter from the Milk of Cows,* (1) *which had been milking for periods exceeding* $6\frac{1}{2}$ *months each, and* (2) *which had been milking for periods of less than* $6\frac{1}{2}$ *months each.*

The following Table shows the results on the average, from 4 tests in each case, when the creaming was effected by the centrifugal cream separator.

TABLE IV.

| — | From Cows milking more than $6\frac{1}{2}$ months each. | From Cows milking less than $6\frac{1}{2}$ months each. |
|---|---|---|
| Temperature of milk,.....Fahr. | 98° | 98° |
| Speed of separator .....per min. | 7,400 | 7,400 |
| Milk per hour..... lbs. | 450 | 500 |
| Fat in milk.....per cent. | 3·68 | 3·18 |
| Fat in skim-milk..... " | ·20 | ·02 |
| Fat in butter-milk ..... " | ·05 | ·06 |
| Butter per 100 lbs. of fat in milk..... lbs. | 115·06 | 120·48 |
| Fat not recovered.....per cent. | 4·23 | ·72 |
| Butter score for flavour out of possible 40 points.... {at 1 week | 37 | 39 |
| {at 14 weeks | 28 | 35 |



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*Conclusions.* The results from these 4 tests indicate that:—

(1.) From the milk of cows, which had been milking for periods exceeding 6½ months each, 3·51 per cent more of the butter-fat was not recovered, even when the rate of inflow of the milk into the centrifugal cream separator was 10 per cent less than in the case of the milk from cows which had been milking for periods of less than 6½ months each;

(2.) The butter from the milk of the cows which had been milking for the longer periods, was not as good in the flavour and did not keep so well as the butter from the milk of the cows which had been milking for the shorter periods.

The following Table shows the results, on the average from 7 tests in each case, when the creaming was effected by the deep-setting milk-pails, set in ice water for a period of 22 hours.

TABLE V.

| | | From Cows milking more than 6½ months each. | From Cows milking less than 6½ months each. |
|---|---|---|---|
| Temperature of milk when set | Fahr. | 85° | 86° |
| Temperature of water | " | 38° | 38° |
| Temperature of milk when skimmed | " | 38° | 38° |
| Fat in milk | per cent. | 3·67 | 3·56 |
| Fat in skim-milk | " | 1·43 | ·21 |
| Fat in butter-milk | " | ·40 | ·35 |
| Butter per 100 lbs of fat in milk | lbs. | 80·91 | 114·85 |
| Fat not recovered | per cent. | 32·55 | 6·34 |
| Butter score for flavour out of possible 40 points | at 4 weeks | 33 | 35 |

*Conclusions.* The results from these tests indicate that:—

(1.) From the milk of cows which had been milking for periods exceeding 6½ months each, 26·21 per cent more of the butter-fat was not recovered, than from the milk of cows which had been milking for periods of less than 6½ months each;

(2.) The butter from the cows which had been milking for the longer periods was not as good in the flavour as the butter from the milk of the cows which had been milking for the shorter periods.

The following Table shows the results, on the average from 8 tests in each case, when the milk of one fresh-calved cow was mixed with the milk of the cows which had been milking for periods exceeding 6½ months each, and when the creaming was effected by the deep-setting milk-pails, set in ice water for a period of 22 hours.

TABLE VI.

| | | From Cows milking more than 6½ months each | From Cows milking less than 6½ months each |
|---|---|---|---|
| Temperature of milk when set | Fahr. | 85° | 85° |
| Temperature of water | " | 38° | 38° |
| Temperature of milk when skimmed | " | 38° | 38° |
| Fat in milk | per cent. | 3·58 | 3·54 |
| Fat in skim-milk | " | ·55 | ·23 |
| Fat in butter-milk | " | ·40 | ·32 |
| Butter per 100 lbs. of fat in milk | lbs. | 103·29 | 114·94 |
| Fat not recovered | per cent. | 14·00 | 6·71 |
| Butter score of flavour out of possible 40 points | at 5 weeks. | 36 | 38 |

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*Conclusions.* The results from these 8 tests indicate that:—

(1.) When the milk of one fresh-calved cow was added to the milk from eight cows, which had been milking for periods exceeding 6½ months each, 7·29 per cent more of the butter-fat was not recovered, than from the milk of cows which had been milking for periods of less than 6½ months each;

(2.) The addition of the milk of one fresh-calved cow to the milk from eight cows which had been milking for periods exceeding 6½ months each, resulted in the recovery of 18·55 per cent more of the butter-fat, than from the milk of the same cows when set in deep-setting milk-pails, without the addition of the milk from a fresh-calved cow.

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### (III.) *Experiments in churning Sweet Cream at different Temperatures.*

During the month of March a number of tests were conducted to ascertain the temperature at which the churning of sweet cream would give the most efficient recovery of the butter-fat. In a No. 5 Daisy revolving barrel churn, of a capacity of fourteen gallons, 16 tests were made as shown in Table VII.

TABLE VII.

| Number of Tests made. | 2 | 6 | 6 | 1 | 1 |
|---|---|---|---|---|---|
| Quantity of cream, ..... lbs. | 42 | 36 | 38·5 | 40 | 23 |
| Temperature when churning was started ..... Fahr. | 41° | 46° | 45° | 48° | 55° |
| do do finished ..... " | 58° | 58° | 59°·5 | 58° | 58° |
| Increase in temperature ..... " | 17° | 12° | 14°·5 | 10° | 3° |
| Period of churning ..... min. | 90 | 75 | 85 | 40 | 10 |
| Speed of churn ..... rev. per min. | 70 | 70 | 68 | 72 | 74 |
| Fat in butter-milk ..... per cent. | 0·10 | 0·20 | 0·25 | 0·25 | 0·60 |

In a No. 2 Daisy revolving barrel churn of a capacity of three gallons, 26 tests were made as shown in Table VIII.

TABLE VIII.

| Number of Tests made. | 9 | 12 | 2 | 1 | 1 | 1 |
|---|---|---|---|---|---|---|
| Quantity of cream ..... lbs. | 20 | 12 | 25·5 | 19 | 30 | 15 |
| Temperature when churning was started ..... Fahr. | 42° | 44° | 50° | 52° | 57° | 58° |
| do do finished ..... " | 60° | 57° | 59° | 58° | 61° | 62° |
| Increase in temperature ..... " | 18° | 13° | 9° | 6° | 4° | 4° |
| Period of churning ..... min. | 113 | 95 | 90 | 50 | 70 | 50 |
| Speed of churn ..... rev. per min. | 68 | 68 | 71 | 65 | 68 | 70 |
| Fat in butter-milk ..... per cent. | 0·15 | 0·20 | 0·15 | 0·30 | 0·50 | 0·40 |

*Conclusions.* The results from these 42 tests indicate that:—

(1.) When the churning of sweet cream is started at a temperature of 50° Fahr., or under, the quantity of butter-fat remaining in the butter-milk need not exceed 0·25 of 1 per cent;

(2.) For the efficient recovery of the butter-fat by the churning of sweet cream, the temperature of the cream should not be above 50° Fahr., when the churning is started; and the churn (if a revolving one) should not be filled to more than one quarter of its actual holding capacity.



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(IV.) *Experiments in the churning of Cream after the addition to it of different percentages of Water.*

Four series of tests were made to compare the results from the churning of cream with and without the addition of different percentages of water to the cream, before it was ripened. These tests were conducted at intervals from May 6th to October 1st. The cream was obtained from mixed herd milk (containing on the average 3·45 per cent of butter-fat) by means of a centrifugal cream separator, which separated 14 per cent of the whole milk as cream. The cream, in each test of the four series, was divided into two equal portions. The one portion was ripened to the usual degree of sourness or was kept sweet, and was churned as normal cream; a percentage of water (from 10 to 30 per cent) was added to the other portion in each test, after which it was churned in the same manner as the normal cream.

The following Table shows the results which were obtained, on the average, from the tests of the different series.

TABLE IX.

| Number of tests made. | Series 1. 5 | | Series 2. 4 | | Series 3. 4 | | Series 4. 5 | |
|---|---|---|---|---|---|---|---|---|
| | Normal Cream. | 10 per cent of water added. | Normal Cream. | 20 per cent of water added. | Normal Cream. | 25 per cent of water added. | Normal Cream. | 30 per cent of water added. |
| Milk per lb. of butter..... lbs. | 25·77 | 26·11 | 24·83 | 25·20 | 25·17 | 25·45 | 25·14 | 25·74 |
| Butter per 100 lbs. of milk. " | 3·88 | 3·83 | 4·03 | 3·97 | 3·97 | 3·93 | 3·98 | 3·88 |
| Butter per 100 lbs. of fat in milk..... ..... " | 115·23 | 113·76 | 116·58 | 114·84 | 113·50 | 112·27 | 115·03 | 112·34 |
| Fat not recovered..... per cent. | 2·32 | 2·37 | 1·83 | 1·83 | 2·41 | 2·61 | 3·20 | 3·12 |

The following Table shows the results, on the average from the 18 tests, with normal cream and the results, on the average from the 18 tests, with cream to which water had been added—(from 10 to 30 per cent as per Table IX).

TABLE X.

| —— | Normal Cream. | Watered Cream. |
|---|---|---|
| Milk per lb. of butter..... lbs. | 25·22 | 25·62 |
| Butter per 100 lbs. of milk..... " | 3·96 | 3·90 |
| Butter per 100 lbs. of fat in milk..... " | 115·08 | 113·30 |
| Fat not recovered..... per cent. | 2·44 | 2·48 |

An examination was made of the quality of the butter obtained. The butter from the watered cream was not so solid or firm in the grain as the butter from the normal cream; there was no appreciable difference in the flavour.

The churning period in every case was longer with the watered cream than with the normal cream. The additional time which was required for churning the watered cream bore no definite ratio to the percentage of water which had been added to the cream. The extra time was from 1 minute to 30 minutes.

*Conclusions. When water was added to the cream* in these 18 tests from May to October, the results indicate that:—

(1.) The churning was slightly less efficient in the recovery of the butter fat;

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(2.) The quantity of marketable butter obtained per 100 lbs. of milk was slightly less (·06 lb.);
(3.) The butter was not so firm or solid in the grain;
(4.) The churning period, at an equal temperature, was longer by from 1 minute to 30 minutes.

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## PART IV.—FORTY-ACRE LOT.

In the spring of 1891, a portion of the farm, measuring about forty acres, was set apart for the particular purpose of growing forage crops for cattle, in order to ascertain and illustrate how many cattle might be fed for the whole year upon the products of that area. It was not intended to adopt a method of cultivation which would require the employment of hand labour to any unusual extent. The main object was to direct the attention of farmers to the easy practicability of keeping cattle in larger numbers, than has been their custom, on the moderate and small sized farms of Canada.

The soil in that part of the farm devoted to this experiment is of a clay and sand loam; about five acres of it are of a light sandy loam; and about three acres of it are of a peaty loam. A dressing of barnyard manure was given to twenty-nine acres of the area in the spring of 1891, at the rate of from 18 to 20 tons per acre.

It was mentioned in my report of last year that the yield of crops in 1891, did not come up to our expectations. A hailstorm on 13th of August, 1891, injured the crops on it, and was estimated to have lessened the returns and the feeding value of them by 25 per cent. The following is a summary of the crops harvested in 1891:—

TOTAL YIELD OF CROPS FROM 40-ACRE LOT IN 1891.

*Ripened Crops.*

| | | Lbs. of Straw. | Lbs. of Grain. |
|---|---|---|---|
| 8 acres, | Mixed Cereal crop | 26,454 | 13,245 |
| 3 acres | Golden Vine Pease | | 905 |
| | Goose Wheat | 1,003 | 437 |
| | Beardless Barley | 3,102 | 1,373 |
| | Banner Oats | 2,790 | 2,060 |
| 3 acres, | Mixed Cereal crop | 10,442 | 4,345 |
| 14 | Totals | 43,791 | 22,365 |

*Root Crops.*

| | | Lbs. |
|---|---|---|
| 1 acre, | Carrots | 26,785 |
| 1 acre, | Mangels and Turnips — Mangels | 8,110 |
| | Mangels and Turnips — Turnips | 9,655 |
| 1 acre, | Turnips | 29,584 |
| 3 | Total | 74,134 |
| ½ acre, | Cabbage and Kohl Rabi | 15,296 |

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*Cured Fodder Crops.*

| | Lbs. |
|---|---|
| 2 acres, Spring Rye | 14,080 |
| Mixed Cereal crop (second cutting) | 1,825 |
| 1 acre, Indian Corn, stooked and cured | 11,940 |
| 11½ acres, Indian Corn, put into silos.....130 tons+ | 1,750 |
| 14½ | |

1½ acres, Indian Corn, fed green to cattle from 7th of August.
3⅜ acres, Mixed Cereal crop, fed green to cattle.
4⅛ acres, pastured.

The total cost for labour in the growing of these crops of 1891, and in the delivering of them at the barn, silos or stable, threshed or cut and ready to feed, was as follows;—

| | |
|---|---|
| Hauling and spreading of manure | $109 62 |
| Ploughing, harrowing, sowing and planting | 114 00 |
| Hand cultivating and weeding | 85 62 |
| Cultivating by horse | 23 65 |
| Reaping, teaming, threshing, cutting, grinding, &c | 223 70 |
| Other labour | 9 15 |
| | $565 74 |
| Permanent improvements, draining and fencing | 33 50 |

The time of a team and man was charged at the rate $2.50 per day and the time of a man at $1.25 per day.

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TOTAL YIELD OF CROPS FROM 40-ACRE LOT IN 1892.

*Cereal Crops.*

| | Lbs. of Straw. | Lbs. of Grain. |
|---|---|---|
| 8·75 acres, Mixed Cereal crop, as in Table I | 25,039 | 13,317 |

| | Lbs., cured Fodder. |
|---|---|
| 5 acres, Mixed Cereal crop, as in Table II | 32,605 |

| | Lbs. green Fodder. |
|---|---|
| 1·75 acres, Mixed Cereal crop (fed green) | 22,801 |
| 3·25 acres, Fall Rye | 26,155 |
| 1·9 acres, Spring Rye | 15,910 |
| second cutting of do. (partly cured) | 4,040 |

*Root Crops.*

| | Lbs. |
|---|---|
| 2 acres, Carrots, as per Table III | 51,015 |
| 2 acres, Mangels do | 57,128 |
| 1 acre, Greystone Turnips (catch crop after crop of mixed cereals) | 20,305 |

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*Indian Corn Crops.*

| | Tons. | Lbs. |
|---|---|---|
| 9 acres, Indian Corn, as per notes, plots Nos. 1 to 6.... | 156 | 352 |
| 3 acres, Indian Corn, do do 7 to 9.... | 39 | 1065 |
| 3 acres, Indian Corn, do do 10 ..... | 38 | 860 |
| ·46 acre, Indian Corn and Sunflowers..... ..... ..... | 4 | 1720 |
| ·46 acre, Sunflower heads ..... ..... | 3 | 710 |
| ·41 + acre, Horse Beans..... ..... ..... ..... | 2 | 1760 |
| 2·43 acres, pastured..... | | |

NOTES ON THE CEREAL CROPS.

8 *acres of Mixed Cereal Crops.*—The soil on which these were grown was a sandy loam, rather uneven in character; part of it was of a peaty nature with interruptions of clay and sandy soil of a whitish colour. Most of the land had formed part of a wet swamp five years before; and portions of the surface soil had been burned during the clearing of it. In the spring of 1891 it received a dressing of barn yard manure at the rate of about 18 tons per acre. A crop of fodder corn was taken off 7 acres of it during that season; the other acre was cropped in 1891 with mixed cereals.

A different mixture, of *Campbell's White Chaff Wheat, Peerless White Barley, Banner Oats* and *Golden Vine Pease*, was sown on each plot. By reason of the uneven character of the soil, the yields per acre from the different mixtures did not give results which can be relied upon as evidence of the best combinations of these grains for fodder crops.

TABLE I.

| Number of Plot. | No. 1. | No. 2. | No. 3. | No. 4. | No. 5. | No. 6. | No. 7. | No. 8. |
|---|---|---|---|---|---|---|---|---|
| Mixture sown— | | | | | | | | |
| Wheat.....Bush. | ½ | 1 | 1 | ..... | 1 | 1½ | ..... | ..... |
| Barley ..... do | ¾ | 1 | ..... | 1 | 1 | ..... | 1½ | ..... |
| Oats..... do | 1 | ..... | 1 | 1 | 1 | ..... | ..... | 1½ |
| Pease..... do | ¾ | 1 | 1 | 1 | ..... | 1½ | 1½ | 1½ |
| Flax..... Lbs. | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Total, Bush. and Lbs.... | 3· 3 | 3 3 | 3 3 | 3 3 | 3 3 | 3 3 | 3 3 | 3 3 |
| Yield of straw and grain ....Lbs. | 4,742 | 4,002 | 4,632 | 4,222 | 4,312 | 4,342 | 3,542 | 4,572 |
| Grain from thresher..... do | 1,598 | 1,361 | 1,516 | 1,522 | 1,337 | 1,490 | 1,479 | 1,600 |

These mixtures were all sown on May 4, and came up from May 14 to 15. They were ripe from August 13 to 17 and were cut between August 15 and 17. The different grains ripened together, with the exception of the oats, which ripened one or two days before the other sorts. The one mixture which did not contain pease (plot No. 5) gave the smallest yield of grain per acre.

*The ¾ acre of Mixed Cereal crop* was grown on an odd strip of land, which had been manured in the spring of 1891. A crop of Indian corn was taken off, and it received a light dressing of barnyard manure in the spring of 1892. The mixture sown was *White Connell Wheat, Oderbruch Oats* and *Mummy Pease*, at the rate of one bushel of each per acre. It was sown on May 4, and it came up and was cut at the same dates as plots Nos. 1 to 8. The total yield was,—straw and grain, 3,990 lbs.; grain from the thresher, 1,414 lbs.

5 *acres of Mixed Cereal crop.*—Five plots of one acre each were sown with different mixtures of *Goose Wheat, Kinver Barley, Banner Oats, Multiplier Pease* and 3 lbs. of Flax per acre. The soil of plots Nos. 1 and 2 was a mellow loose sandy loam. It had been cropped in 1891 by rye, which was cut green, followed during the same season by Hungarian grass. A dressing of manure at the rate of 10 or 12 tons per

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acre was applied in the spring of 1892. Plots Nos. 3, 4 and 5 were on land which had been manured in 1891 and had been cropped during that season with roots. No manure was applied to them in 1892.

TABLE II.

| Number of Plot. | No. 1. | No. 2. | No. 3. | No. 4. | No. 5. |
|---|---|---|---|---|---|
| Mixture sown— | | | | | |
| Wheat.....Bush. | ½ | 1 | 1 | ..... | 1 |
| Barley.....do | ¾ | 1 | ..... | 1 | 1 |
| Oats.....do | 1 | ..... | 1 | 1 | 1 |
| Pease.....do | ¾ | 1 | 1 | 1 | ..... |
| Flax.....Lbs. | 3 | 3 | 3 | 3 | 3 |
| Total.....Bush. and Lbs. | 3 3 | 3 3 | 3 3 | 3 3 | 3 3 |
| Yield of cured fodder.....Lbs. | 7,991 | 5,556 | 5,376 | 6,606 | 7,076 |

These mixtures were all sown on April 30, and came up May 13 and 14. They were cut for cured fodder on August 6 and 8. On account of the wet weather which prevailed, the crops from the different plots did not reach a uniform state of dryness; the weight which is recorded for plot No. 1 was obtained from weighing part of the crop when it was comparatively wet.

1·75 *acres Mixed Cereal crop.*—The soil was clay loam; it received a light dressing of manure in the spring of 1892 at the rate of about 10 tons per acre. The crop was cut and fed green to the cattle from day to day. The total yield of green fodder was 22,801 lbs.

### COST OF LABOUR FOR GROWING MIXED CEREAL CROPS.

The following statement of the cost of labour for growing 13¾ acres of mixed cereal crops, may afford useful information for the making of comparisons between the cost of this and other kinds of fodder.

| | |
|---|---|
| Rent of land, at $3 per acre | $ 41 25 |
| Ploughing, at $2 per acre | 27 50 |
| Harrowing twice, rolling once at 20 cents per acre each. | 8 25 |
| Seed, 3 bushels per acre | 24 75 |
| Sowing 1 6/10 days at $2.50 per day | 4 00 |
| Cutting with mower, 3 8/10 days, at $2.50 per day | 9 50 |
| Labour, turning and cocking, 9 days at $1.25 per day | 11 25 |
| Drawing in, 3 days at $2.50 per day | 7 50 |
| Labour, loading and unloading, 11 days at $1.25 per day. | 13 75 |
| Horse-rake and horse-fork, 1 4/10 days at $1.50 | 2 10 |
| Threshing (8¾ acres), 10 days at $1.25 per day | 12 50 |
| Man at engine | 1 50 |
| Proportion of time of farm foreman | 27 50 |
| | $ 191 35 |

These figures do not include any allowance for the use of farm machinery, nor do they include any amount as an equivalent for the exhaustion of the soil. The cost for labour, without threshing, is $12.90 per acre. The average yield of the cured fodder crops from 5 acres was 3 tons 521 lbs. per acre, which gives an average cost of $3.95 per ton for labour of growing, including cost of seed and rent of land.

### CROPS OF RYE FOR FODDER.

3·25 *acres of Fall Rye.*—Fall rye of the variety *Reading Giant* was sown in September, 1891, on light sandy loam. It followed a crop of fodder corn which had been taken off in 1891. Part of the rye crop was fed green, the remainder of it was

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cut on 15th June and put into a silo. It was run through a straw cutter. The total yield was 13 tons 155 lbs.

1·9 *acres of Spring Rye.*—This was sown on a light clay loam soil, lying adjacent to the pasture plot, for the purpose of seeding it down. It yielded 7 tons 1,910 lbs.

COST OF LABOUR FOR GROWING CROP OF RYE FOR FODDER.

The following is a statement of the cost of labour for growing 5·15 acres of rye and putting the crop in the stable and the silo.

| | |
|---|---|
| Rent of land, at $3 per acre | $ 15 45 |
| Ploughing, at $2 per acre | 10 30 |
| Harrowing twice, rolling once, at 20 cents per acre each | 3 09 |
| Seed, 7½ bushels at $1 per bushel | 7 50 |
| Sowing $\frac{5}{10}$ day at $2.50 per day | 1 25 |
| Cutting with binder and mower, $1\frac{2}{10}$ days at $2.50 per day | 3 00 |
| Drawing in, 1 day at $2.50 | 2 50 |
| Labour, loading and cutting, 5 days at $1.25 per day | 6 25 |
| Man at engine | 1 50 |
| Binding twine, 16 lbs. at 11 cents per lb | 1 76 |
| Stablemen's time, taking in the part fed green | 2 25 |
| Proportion of time of farm foreman | 10 30 |
| | $ 65 15 |

These figures do not include any allowance for the use of farm machinery, nor do they include any amount as an equivalent for the exhaustion of soil. The cost for labour was $12.65 per acre. The average yield of the rye fodder, weighed green, was 4 tons 64 lbs. per acre, which gives an average cost of $3.13 per ton, for labour of growing, including cost of seed and rent of land.

ROOT CROPS.

4 *acres of Root Crops.*—The soil was a sandy loam with a distinctly peaty character. It received a dressing of barnyard manure at the rate of about 18 tons per acre in the spring of 1891. In that season a crop of mixed cereals was taken off. No manure was applied in 1892. Carrots and mangels were put in rows 2 feet 3 inches apart. They were sown from May 10 to 13. The mangels came up from May 23 to 24; and the carrots came up from May 24 to 30. All of the 8 plots of ½ acre each were cultivated with a small hand cultivator on June 4, and with a horse cultivator on June 7 and June 23. They were thinned from June 28 to July 5. They were pulled October 22. The yields are given in the following Table.

TABLE III.

| Plot No. | Varieties of Carrots. | Yields per ½ Acre. |
|---|---|---|
| 1 | Steele's Improved Short White | 7 tons 260 lbs. |
| 2 | Rennie's New Mammoth Intermediate | 7 " 1,330 " |
| 3 | Pearce's Orange Giant | 5 " 285 " |
| 4 | Steele's Guerande or Ox Heart | 5 " 1,140 " |
| | *Varieties of Mangels.* | |
| 5 | Rennie's Selected Mammoth Long Red | 8 " 525 " |
| 6 | Pearce's Canadian Giant | 8 " 750 " |
| 7 | Steele's New Giant Yellow Intermediate | 5 " 1,816 " |
| 8 | Rennie's Giant Yellow Globe | 6 " 37 " |
| | Total from 4 acres | 54 tons 143 lbs. |

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### Cost of Labour for Growing Roots.

The following is a statement of the cost of labour for growing 4 acres of roots (carrots and mangels) and putting the crop in the root-house.

| | |
|---|---|
| Rent of land, at $3 per acre | $ 12 00 |
| Ploughing, at $2 per acre | 8 00 |
| Harrowing twice, rolling once, at 20 cts. per acre each | 2 40 |
| Seed, carrots, 10 lbs., at 50 cts. per lb. | 5 00 |
| Seed, mangels, 10 lbs., at 20 cts. per lb. | 2 00 |
| Sowing, $1\frac{5}{10}$ days, at $1.25 per day | 1 88 |
| Cultivating by hand, 3 days, at $1.25 per day | 3 75 |
| Cultivating with single horse, $5\frac{7}{10}$ days, at $1.50 per day | 8 55 |
| Labour, thinning, $11\frac{5}{10}$ days, at $1.25 per day | 14 38 |
| Labour, hoeing, 21 days, at $1.25 per day | 26 25 |
| Labour, pulling, 25 days, at $1.25 per day | 31 25 |
| Drawing in, $3\frac{2}{10}$ days, at $2.50 per day | 8 00 |
| Proportion of time of farm foreman | 12 00 |
| Total | $135 46 |

These figures do not include any allowance for the use of farm machinery, nor do they include any amount as an equivalent for the exhaustion of soil. The cost for labour was $33.86 per acre. The average yield of the roots was 13 tons 1,035 lbs. per acre, which gives an average cost of $2.50 per ton, for labour of growing, including cost of seed and rent of land.

### Indian Corn Crops.

9 *acres of Indian Corn.*—The soil for the six plots of corn in this division, was a clay loam which had been cropped with mixed cereals in 1891. It had not been manured for at least six years. In the spring of 1892, it received a dressing of barnyard manure at the rate of about ten tons per acre.

*Plot No.* 1 contained 2 acres. It was planted by the use of a hand corn planter on 18th of May, with *Thoroughbred White Flint* corn, in hills 3 feet apart both ways, with from 4 to 5 grains per hill. Some of it came up 1st and 2nd of June, but more than one-half of the kernels rotted in the ground, apparently by reason of the cold and wet weather which prevailed. It was harrowed on the 4th of June, and the blank hills were replanted on 10th June.

On 29th June, two or three grains of *Asparagus Pole Beans* were dibbled in beside every hill of corn in two rows; the next two rows of corn were left without beans; beans were planted at every hill in the next two rows, and in every alternate two rows across the whole plot. The beans came up 9th and 10th July. They gave a rather spindling growth of vines and bore fairly long pods which were filled but not ripened.

The ears on the corn reached the early milk stage; but on the whole, the crop was not sufficiently advanced in growth to make the best quality of ensilage. The leaves were dried and withered to a considerable extent as the result of frost on 9th September. It was cut 26th to 27th September. The total yield from the two acres was 43 tons 1,830 lbs., weighed without being wilted.

*Plot No.* 2 contained 2 acres. It was planted with *Longfellow* corn, at the same time and in the same way as plot No. 1. It came up on the 2nd of June and was harrowed 4th of June.

On the 29th of June, *Butter Pole Beans* were planted at every hill in every two alternate rows as in plot No. 1. These beans rotted in the ground at nine hills out

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of ten. The few which grew were not vigorous, and did not have any appreciable value in the crop.

The corn reached the glazing stage of growth, before it was caught by a frost on the 9th of September, which caused the leaves to become dry and withered. The total yield from the 2 acres was 36 tons 733 lbs., weighed without being wilted.

*Plot No.* 3, contained 2 acres. It was planted with *Pearce's Prolific* corn, at the same time and in the same way as plots Nos. 1 and 2. It came up on 2nd of June and was harrowed on the 4th of June.

On 29th of June, *Dutch Case Knife Pole Beans* were planted at every hill on every two alternate rows, as in plots Nos. 1 and 2. These beans came up 9th and 10th July, and reached the stage of growth when the pods were fit for cooking as a table vegetable.

The corn reached the glazing stage of growth. The leaves were dried and withered in consequence of frost before it was cut. The total yield from the 2 acres was 29 tons 539 lbs., weighed without being wilted.

*Plot No.* 4 contained 1 acre. It was planted on May 25th with *Pearce's Prolific* corn in hills 3 feet apart both ways, with from 4 to 5 grains per hill. It came up June 3 and was harrowed June 4. Part of this plot was cut green from August 31 for feeding the cattle daily. When the remainder of it was cut for the silo on September 13 it had reached the glazing stage of growth. The total yield from the one acre was 16 tons 950 lbs., weighed without being wilted.

*Plot No.* 5 contained 1 acre. It was planted with *Longfellow* corn, at the same time and in the same way as plot No. 4. It also came up and was harrowed at the same time. The crop on this plot was cut from August 12, and was fed to the cattle daily until August 31. The total yield from the one acre was 15 tons 1,045 lbs.

*Plot No.* 6 contained 1 acre. It was planted with *Thoroughbred White Flint* corn, at the same time and in the same way as plots Nos. 4 and 5. It also came up and was harrowed at the same time. The crop on this plot reached the early milk stage of growth, and was not near enough to maturity to yield the best quality of ensilage. The total yield from the one acre was 20 tons 1,125 lbs., weighed without being wilted.

3 *acres of Indian Corn.*—The soil was a sandy loam, which had received a dressing of barnyard manure in 1891, had been cropped by Indian corn, and had received a dressing of barnyard manure in the spring of 1892 at the rate of about 10 tons per acre.

*Plot No.* 7 contained 1 acre. It was planted on May 25, with *Longfellow* corn, in hills 3 feet apart both ways, with from 4 to 5 grains per hill. It was harrowed on June 2 and came up June 3. It had reached the glazing stage of growth before it was caught by a frost on September 9, which caused the leaves to become dry and withered. It was cut and put in a silo on September 21 and 22. The total yield from the acre was 10 tons 1,895 lbs., weighed without being wilted.

*Plot No.* 8 contained 1 acre. It was planted at the same time as plot No. 7, with *Longfellow* corn; but in this case the corn was grown in rows 3 feet apart, with from 3 to 4 grains per lineal foot in the rows. The total yield from the acre was 11 tons 1,525 lbs., weighed without being wilted.

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*Plot No.* 9 contained 1 acre. It was planted on May 26 with a mixture of equal parts of *Longfellow* corn and *Horse Beans*, in rows 3 feet apart, at the rate of 24 lbs. of the mixture per acre. The beans grew in the rows with the corn to a height of from 3 feet to 3½ feet, and carried pods which in a few instances contained ripened beans. The bean stalks in most cases were green and succulent when the crop was cut. The corn had reached the glazing stage of growth. The whole crop was put into a silo on September 21. The total yield from the acre was 16 tons 1,645 lbs., weighed without being wilted.

3 *acres of Indian Corn and Horse Beans.*—The soil of this plot was a mellow sandy loam. A crop of fall rye had been grown upon it, and had been cut on 15th June. A dressing of barnyard manure at the rate of 8 to 10 tons per acre was applied. On 18th June it was planted with a mixture of *Smut Nose Flint* corn and horse beans, in rows 3 feet apart, at the rate of 12 lbs. of each per acre. The corn was entirely eaten off by crows. It was replanted on 29th June, and suffered a like fate from the crows, in spite of scarecrows and corn soaked in a mixture of Paris green, &c. It was planted the third time on 6th July, with the mixture of *Smut Nose Flint* corn and *Horse Beans*. It came up 12th July. The corn attained a height of about 6 feet and reached the stage of growth when ears were beginning to appear. The bean stalks were from 3 feet to 3½ feet in height, but pods were not formed on them. On 15th September the crop was cut and put into a silo without being wilted. The leaves of the corn were dry and withered from a frost which came on 9th September. The total yield from the 3 acres was 38 tons 860 lbs.

### Cost of Labour for growing Indian Corn for Fodder.

The following is a statement of the cost of labour for growing 15 acres of Indian corn and putting the crop into silos or the stable for feeding cattle.

| | |
|---|---|
| Rent of land, at $3 per acre | $ 45 00 |
| Ploughing, at $2 per acre | 30 00 |
| Harrowing 3 and 4 times, 20 cents per acre per time | 10 80 |
| Marking hills, 1 2/10 days, at $1.50 per day | 1 80 |
| Marking hills, 1 day at $1.25 per day | 1 25 |
| Seed | 7 50 |
| Sowing, 1 day at $2.50 | 2 50 |
| Planting by hand, 7 days at $1.25 per day | 8 75 |
| Cultivating with single horse, 3 6/10 days, at $1.50 per day | 5 40 |
| Cultivating with team, 7 2/10 days, at $2.50 per day | 18 00 |
| Hoeing, 16 days at $1.25 per day | 20 00 |
| Cutting in field and at silo, 67 days at $1.25 per day | 83 75 |
| Drawing in, 13 days at $2.50 per day | 32 50 |
| Man at engine, 7 days at $1.50 per day | 10 50 |
| Use of engine and fuel, 6½ days at $5 per day | 32 50 |
| Proportion of time of farm foreman | 30 00 |
| | $340 25 |

These figures do not include any allowance for the use of farm machinery (except the engine), nor do they include any amount as an equivalent for the exhaustion of soil. The cost for labour was $22.68 per acre. The average yield of the corn was 15 tons 1,218 lbs. per acre, which gives an average cost of $1.45 per ton, for labour of growing, including cost of seed and rent of land.

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# PART V.—DAIRY BULLETINS.

## MILK FOR CHEESE FACTORIES.

### FEED.

The grass of early summer is too watery and weak in feeding substance, to be fed alone to cows to the greatest advantage. A judicious allowance of bran, pease, oats, other grain, oil-cake or cotton-seed meal, will increase the supply of milk, and fortify the cow's system for the production of a larger quantity of it during mid-summer, fall and winter. A soiling crop of some sort should be grown, to furnish plenty of succulent fodder at the time when pasture may be bare or dry from prolonged drought. Indian corn,—when grown to the glazing stage, in rows or hills 3 feet or 3½ feet apart with from 2 or 3 seeds per foot in the row,—yields a fodder by the use of which cows are enabled to produce a large amount of milk, butter or cheese per acre of land. Fodder corn is not a complete ration, and when it is supplemented by grass, grain, bran, oil-cake, or similar feeds, better returns may be realized for the feed consumed than when it is fed alone.

### WATER.

An abundant supply of pure water should be easily accessible. Cows which are denied access to plenty of water, will not give as much milk, or milk of as good quality, as when plenty of it is provided with wholesome nutritious feed.

### SALT.

Dairy cattle should have access to salt every day, and it should be added to their stable feed daily.

From Quebec westward as far as the Rocky Mountains, cows will consume an average of 4 ounces of salt per day, while they are milking during the summer.

### SHELTER.

Comfortable quarters are indispensable to the health and well-being of cows. During the winter, stables should be kept at a temperature within the range of from 40° to 55° Fahr. In summer some shade should exist or be provided in the pasture fields, or adjoining them, to protect the cattle against the exhausting influence of July and August suns.

### MILKING.

When practicable, the milking of each cow should be done by the same person, and with regularity as to time. He only who hath clean hands should be allowed to milk a cow. It is no more difficult to milk with the hands dry than with them wet. It is certainly more cleanly, and leaves the milk in a more desirable condition for table use or manufacture. A pure atmosphere in the stables is necessary to prevent contamination from that source. The immediate straining of the milk will remove impurities from it which otherwise might be dissolved to the permanent injury of the whole product.

### AERATION.

After it is strained the milk should be aerated. Too often it is poured into one large can and left undisturbed. That neglect implies three things which are injurious to it for cheese-making:—

(1.) The peculiar odour which the cow imparts to the milk will be left in it, until it becomes fixed in its flavour;

(2.) The germs of decomposition, that come in the milk and into it from the air, have the best conditions for growth and action when the milk is left undisturbed;

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(3.) The milk will become in a degree less fit for perfect coagulation by rennet.

Hence it is needful and advantageous to aerate it for three reasons:—

(1.) By pouring, stirring, dipping or trickling it over an exposed surface, any objectionable volatile element that may be in the milk will be eliminated from it by evaporation;

(2.) Neglect of aeration will increase the quantity of milk required to make a pound of fine cheese;

(3.) It has been found impracticable to make strictly first-class Cheddar cheese from milk that has not been aerated.

### COOLING.

The cooling of the milk should not precede the aeration. A temperature of from 60° to 70° Fahr. will be found cold enough for the keeping of milk over night, when it has been aired previously.

### PROTECTION.

Milk is a liquid of absorbent proclivities. It should be protected against such injury as would result from exposure to impure air. A general purpose milk-stand is a device specially adapted for the spoiling of milk. Such a contrivance serves as a combined milk-stand and carriage stand, both of which are legitimate uses. Sometimes it is occupied also as a bivouac for swine, with the end of the whey-trough furnishing one step for the stand. Both of these latter extensions of its uses and hospitalities are wrong.

### HONEST MILK.

The employment of inspectors, the use of the "Babcock Milk Tester," and particularly the payment of milk according to the percentage of solids in it, promise to improve the quality of the milk furnished by some patrons. The adulteration of milk by the addition of water, the removal of any portion of the cream, and the keeping back of any part of the strippings, are forbidden by the Dominion statutes. The inspectors appointed by the Dairymen's Associations have been equipped with suitable and competent testing instruments, and have been instructed to render every assistance to cheese-makers in the prevention of adulteration and the conviction and punishment of those who may be found guilty of the practice.

### MATTERS MOST NEEDFUL OF CARE.

Helpful advice on the matters most needful of care are put in the following paragraphs.

1. Only the milk from cows in good health and apparent contentment, should be used.

2. Until after the eighth milking, it should not be offered to a cheese factory.

3. An abundant supply of cheap, succulent, easily digestible, wholesome, nutritious feed should be provided.

4. Pure cold water should be allowed in quantities limited only by the cow's capacity and desire to drink.

5. A box or trough containing salt to which the cows have access every day, is necessary for the keeping of cows profitably.

6. Cows should be prohibited from drinking stagnant, impure water. The responsibility for giving effect to that beneficial prohibition, rests wholly with the individual farmer.

7. Cows should be treated with invariable kindness and they should not be driven fast.

8. All the vessels used in the handling of milk should be cleaned thoroughly immediately after their use. A washing in tepid or cold water to which has been added a little soda, and a subsequent scalding with boiling water, will prepare them for *airing*, that they may remain perfectly sweet.

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9. Cows should be milked *with dry hands*, and only after the udders have been washed or brushed clean.

10. Tin pails only should be used.

11. All milk should be strained *immediately* after it is drawn.

12. Milking should be done and milk should be kept only in a place where the surrounding air is pure. Otherwise the presence of the tainting odours will injure the milk.

13. All milk should be *aired* immediately after it has been strained. The treatment is equally beneficial to the evening and morning messes of the milk.

14. In warm weather all milk should be cooled to the temperature of the atmosphere after it has been aired, but not before.

15. Milk is better for being kept over night in small quantities rather than in a large quantity in one vessel.

16. Milk-stands should be constructed to shade the cans or vessels containing milk, as well as to shelter them from rain. Swine should not be fed near the milk-stand.

17. Only pure, clean, honest milk should be offered; and it should be paid for according to its quality and quantity.

## NOTES FOR CHEESEMAKERS FOR MAY.

### FACTORIES AND THEIR SURROUNDINGS.

1. *The present*, not next week, will be the best time to see that all the drainage facilities of the factory are adequate and in good running order.

2. Whey runs, spouts and tanks should be put into such shape that leaking will not occur.

3. If there be a leakage from floors, spouts or tanks, which is not immediately preventable, provision should be made at once for the removal of the waste, if only by shallow open trenches. A liberal supply of lime and gypsum should be spread around such places. Do not fail to secure a barrel or two of each, *some time this month*, for use during the hot weather.

4. If the factory buildings are not painted and will not be painted, get them whitewashed this month. If you cannot get that done by the proprietors or managers, get permission and do the rest yourself. A curing-room of imperfect construction, whitewashed on the outside, can be kept 10 degrees cooler in summer than one of a dark colour. If the cheese become injured, through excess of heat, neither the buyers nor the patrons will excuse you, whether the blame belongs to you or not.

5. Make the surroundings of the factory neat and tidy.

6. While keeping the outside of the premises creditable to your taste and neat habits, make the inside to reflect your aversion to everything untidy and dirty. Give every part of the factory a thorough cleaning and keep it in a sweet state all summer.

7. Before the curing-room contains any cheese, fumigate it by burning in it sulphur mixed in alcohol, and spray or wash every part of the inside of the factory with a solution of 1 part of bichloride of mercury in 2,000 parts of water. That will help to prevent the growth of mould on the outside of the cheese, and may lessen the occurrence of floating curds in summer.

8. The leisure hours of May, before the large flow of milk is received, should be improved by putting all the apparatus, appliances, utensils and machinery into the best of working order.

9. Be sure that the making-room floor is so constructed and supported that it will not shake or vibrate *during* the coagulation of the milk.

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MILK AND MAKING.

1. Procure a copy of "Milk for Cheese Factories" for each of your patrons by applying to the Dairy Commissioner, Central Experimental Farm, Ottawa, stating the number required and the address to which they are to be sent. They will be furnished free in French and English.

2. Look out for "leeky" flavours in the milk. Do not put such milk into the vat with that of the other patrons. If you have time, make it up by itself, and send the cheese from it to the patron for his private use.

3. Make provision for keeping a record of the work of every day.

4. Milk seldom requires to be ripened for setting, during this month.

5. Use enough rennet to coagulate the curd into a state fit for cutting, in from 17 to 20 minutes, at from 82° to 88° Fahr.

6. Cut it slowly and very carefully.

7. Use the horizontal knife first.

8. Afterwards allow the curd to settle until the whey comes over nearly the whole surface of it.

9. Then begin to cut it with the perpendicular knife.

10. Immediately after the cutting is completed, begin to stir the mass slowly and continuously until the curd is "cooked" or firm.

11. Heat should not be applied until ten minutes after the stirring is begun.

12. The heating should be effected gradually, at the rate of 1 degree every 4 or 5 minutes, until 98° Fahr. is reached.

13. Draw most of the whey early, and so guard against being caught unprepared by the rapid development of acid.

14. Do not dip the curd until the presence of acid is discernible by the hot iron test. "Sweety flavours" result from removing the whey too soon.

15. After dipping the curd, or removing the whey, stir the curd gently and keep it at a temperature above 94° Fahr.

16. Do not attempt close matting, high piling or packing of the curd this month. Let it be kept loose until the whey has been drained out of it.

17. When it begins to feel "slippy" and smells like fresh-made butter, it should be put through the curd cutter or grinder.

18. Acid developes rapidly, and care must be taken to make the curd dry or firm in advance of the development of acid.

19. After grinding or cutting, stir for 10 or 15 minutes before salting.

20. Apply salt at a rate of about 1½ lbs., early in the month, to 2 lbs. per 1,000 lbs. of milk during the last ten days, varying the quantity according to the wet or dry condition of the curd.

21. Begin to put the curd in the hoops within 20 minutes after the salt is stirred in.

22. Use only pure water in bandaging.

23. Guard against the formation of edges or shoulders on the cheese from the hoop-followers being too small. Apply the pressure gradually until the whole power through the long lever is used, after four hours.

24. Leave the press-cloths on, and turn the cheese in the hoops every morning. Let no cheese leave the press-room until the shape is symmetrical and the finish neat.

25. If and when the press-cloths are removed, use hot clean whey-oil or butter, into which has been dissolved a teaspoonful of soda per cupful of oil.

26. Try to keep the temperature of the press-room above 60° Fahr.

27. The curing-room should be kept at a temperature continuously between 65° and 70° Fahr.

28. Provide strong, smooth boxes of the exact size.

29. Stencil the weight of the cheese in neat figures on the side of every box.

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BRANDING.

I advise every cheesemaker, who manufactures cheese of first class-quality, to brand or stamp the word "Canadian" on the side of every cheese, and also on the side of every box which contains the same. In order to secure neatness in design and a measure of uniformity, the following figures are presented as suitable forms for the brand or stamp. The letters may be ½-inch or ¾-inch size.

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## An Act to prevent the manufacture and sale of filled or imitation cheese, and to provide for the branding of dairy products.

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

SHORT TITLE.

**1.** This Act may be cited as "*The Dairy Products Act*, 1893."

IMITATION CHEESE PROHIBITED.

**2.** No person shall manufacture, or shall knowingly buy, sell, offer, expose or have in his possession for sale, any cheese manufactured from or by the use of skimmed milk, to which there has been added any fat which is foreign to such milk.

PENALTY.

(2.) Every person who, by himself or by any other person to his knowledge, violates the provisions of this section, shall, for each offence, upon conviction thereof before any justice or justices of the peace, be liable to a fine not exceeding five hundred dollars and not less than twenty-five dollars, together with the costs of pro-



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secution, and in default of payment of such fine and costs shall be liable to imprisonment, with or without hard labour, for a term not exceeding six months, unless such fine and the costs of enforcing it are sooner paid.

SKIM-MILK CHEESE TO BE MARKED.

**3.** No person shall sell, offer, expose, or have in his possession for sale, any cheese manufactured from or by the use of milk commonly known as "skimmed milk," or milk from which cream has been removed, or milk to which skimmed milk has been added, unless the words "skim-milk cheese" are branded, marked or stamped in a legible manner upon the side of every cheese, and also upon the outside of every box or package which contains the same, in letters not less than three-quarters of an inch high and three-quarters of an inch wide.

MARK NOT TO BE REMOVED.

(2.) No person, with intent to misrepresent or to defraud, shall remove, or in any way efface, obliterate or alter the words "skim-milk cheese" on such cheese, or on any box or package which contains the same.

PENALTY.

(3.) Every person who, by himself or by any other person to his knowledge, violates any of the provisions of this section, shall, for each offence, upon conviction thereof before any justice or justices of the peace, be liable to a fine not exceeding five dollars and not less than two dollars for every such cheese, or box, or package which is sold, offered, exposed or had in his possession for sale, together with the costs of prosecution, and in default of payment of such fine and costs shall be liable to imprisonment, with or without hard labour, for a term not exceeding three months, unless such fine and the costs of enforcing it are sooner paid.

"CANADIAN" AS A BRAND.

**4.** No person shall apply any brand, stamp or mark of the word "Canadian," "Canadien" or "Canada" as a descriptive term, mark or brand, upon any cheese or upon any box or package which contains cheese or butter, unless such cheese and butter have been produced in Canada.

SALE OF CHEESE SO BRANDED FALSELY.

(2.) No person shall knowingly sell, offer, expose or have in his possession for sale, any cheese or butter upon which, or upon any box or package which contains the same, the word "Canadian," "Canadien," or "Canada" is applied as a descriptive term, mark or brand, unless such cheese and butter have been produced in Canada.

PENALTY.

(3.) Every person who, by himself or by any other person to his knowledge, violates any of the provisions of this section, shall, for each offence, upon conviction thereof before any justice or justices of the peace, be liable to a fine not exceeding twenty dollars and not less than five dollars for every such cheese or box or package, which is sold, offered, exposed or had in his possession for sale, together with the costs of prosecution, and in default of payment of such fine and costs shall be liable to imprisonment, with or without hard labour, for a term not exceeding three months, unless such fine and the costs of enforcing it are sooner paid.

NAME OF COUNTRY WHERE PRODUCED TO BE MARKED.

**5.** No person shall sell, offer, expose or have in his possession for sale, any cheese or butter which is produced in any foreign country, unless the name of the country

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where such cheese or butter was produced, is branded, stamped or marked in a legible manner on the outside of every box or package which contains the same, in letters not less than three-eighths of an inch high and one-quarter of an inch wide.

PENALTY.

(2.) Every person who, by himself or by any other person to his knowledge, violates the provisions of this section, shall, for each offence, upon conviction thereof before any justice or justices of the peace, be liable to a fine not exceeding five dollars and not less than two dollars for every such cheese, or box, or package of butter, which is sold, offered, exposed or had in his possession for sale, together with the costs of prosecution, and in default of payment of such fine and costs shall be liable to imprisonment, with or without hard labour, for a term not exceeding three months, unless such fine and the costs of enforcing it are sooner paid.

WHO SHALL BE LIABLE.

**6.** The person on whose behalf any cheese or butter is manufactured, sold, offered, exposed or had in possession for sale, contrary to the provisions of the foregoing sections of this Act, shall be *primâ facie* liable for the violation of any of the provisions of this Act.

PROCEDURE.

**7.** In any complaint, information or conviction under this Act, the matter complained of may be declared, and shall be held to have arisen, within the meaning of "*The Summary Convictions Act*," at the place where the cheese or butter complained of was manufactured, sold, offered, exposed or had in possession for sale.

APPEAL.

**8.** No appeal shall lie from any conviction under this Act except to a superior, county, circuit or district court, or the court of the sessions of the peace, having jurisdiction where the conviction was had; and such appeal shall be brought, notice of appeal in writing given, recognizance entered into or deposit made within ten days after the date of conviction; and such appeal shall be heard, tried, adjudicated upon and decided, without the intervention of a jury, at such time and place as the court or judge hearing the same appoints, within thirty days from the date of conviction, unless the said court or judge extends the time for hearing and decision beyond such thirty days; and in all other respects not provided for in this Act the procedure under "*The Summary Convictions Act*," so far as applicable shall apply.

RIGHT TO MAKE EXAMINATION OF CHEESE OR BUTTER.

**9.** It shall be lawful for any person who may be charged with the enforcement of this Act to enter upon the premises of any person suspected of violating the provision of this Act, and make an examination of cheese or butter; and any such suspected person, who obstructs or refuses to permit the making of any such examination, shall upon conviction thereof, be liable to a penalty not exceeding five hundred dollars and not less than twenty-five dollars, together with the costs of prosecution, and in default of payment of such penalty and costs, shall be liable to imprisonment, with or without hard labour, for a term not exceeding six months, unless the said penalty and the costs of enforcing the same are sooner paid.

APPLICATION OF PENALTIES.

**10.** Any pecuniary penalty imposed under this Act shall, when recovered, be payable, one-half to the informant or complainant, and the other half to Her Majesty.



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GOVERNOR IN COUNCIL MAY MAKE REGULATIONS.

**11.** The Governor in Council may make such regulations as he considers necessary in order to secure the efficient operation of this Act; and the regulations so made, shall be in force from the date of their publication in the *Canada Gazette*, or from such other date as is specified in the proclamation in that behalf.

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## NOTES FOR CHEESE-MAKERS FOR JUNE.

Years ago our June cheese won a reputation as the finest of the summer. A considerable proportion of the cheese manufactured in June is still faulty. Wrong practice in the handling of the curd in some factories has resulted in cheese which are "open and weak in the body;" in other instances the fear of erring in that direction had caused cheese-makers to turn out goods which are "too dry," "too firm" or "too hard." The qualities that are wanted in June cheese, for both the foreign and home markets, are:—

1. A flavour which is full, rich, clean and creamy;
2. A body and texture which are solid, buttery and uniformly fine in the grain;
3. A bright uniform colour;
4. A clean, neat and symmetrical appearance.

The following particular directions are given to assist cheese-makers in manufacturing the finest quality of Canadian cheddar cheese during this month.

Every cheese-maker of prudent ambition should write to the DAIRY COMMISSIONER, CENTRAL EXPERIMENTAL FARM, OTTAWA, asking for entry forms and address labels for cheese for the World's Columbian Exposition at Chicago. They will be furnished free, and it will not cause the individual cheese-maker any loss to make an exhibit.

### *Factories and their Surroundings.*

1. The beginning of this month will be a good time to see that all the drainage facilities of the factory are adequate and in good running order.
2. Whey-runs, spouts and tanks should be kept in such order that leaking will be prevented.
3. If there be a leakage anywhere from floors, spouts or tanks, which is not immediately and wholly preventible, some provision should be made at once for the drainage of the waste,—if only by means of shallow open trenches.
4. The surroundings of the factory should be kept neat and tidy; and when at all convenient, the appearance of the place may be improved by the planting of a few flowers.
5. While the outside of the premises should be kept as creditable to your taste and habits of neatness as possible, the inside should be made to reflect still more your intolerable aversion to everything untidy and dirty. The factory should be thoroughly cleaned in every part at least once a week, and thus be kept in a sweet state all summer.
6. The outside of the milk vats, cheese presses, curd sinks, and larger utensils, should get a thorough cleaning once every week.
7. Make sure that the floor of the making room is so well supported that it will not shake or vibrate during the coagulation of the milk in the vats.
8. Particular care should be taken to keep the curd-cutter or grinder, the curd-whisk or brush, and the curd-cloths *perfectly clean;* otherwise they will become prolific distributors of ferments which produce bad flavours.

### *Details of the Process.*

1. Encourage each patron to take a personal interest in the care of the milk which is furnished in his name. Procure a number of copies of Bulletin No. 1, "Milk for Cheese Factories" for your patrons, by applying to the Dairy Commis-

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sioner, Central Experimental Farm, Ottawa, stating the number wanted, the name of the factory, and the address to which they are to be sent. They will be furnished free in English and French.

2. Keep a careful look-out for all tainted milk; if any patron persists in sending such milk to the factory after his attention has been called to it repeatedly, try to make it up by itself; then send the cheese from it to the patron for his private use.

3. Keep a short record of every day's work, and of the quality of the cured cheese from any vat to which unusual treatment has been given.

4. Sufficient rennet should be used to coagulate the milk into a state fit for cutting in from 30 to 40 minutes at from 88° to 84° Fahr. When an extra quantity of rennet is added to the milk, a corresponding increase in the weight of salt, should be added to the curd.

5. A thorough distribution of the rennet in the milk should be effected, by diluting the rennet extract to a volume of at least one gallon of liquid for every vat, and by vigorous stirring.

6. The contents of the vat should be perfectly still when coagulation becomes visible. Any vibration of the floor and of the vat during the thickening of the milk, causes waste.

7. The horizontal knife should be used first, and the cutting should be lengthwise of the vat; the curd may afterwards be allowed to settle until the whey comes over nearly the whole surface; then the perpendicular knife may be used.

8. Immediately after the cutting is completed, the stirring of the mass slowly and continuously should be commenced; active stirring by the use of a rake should not be commenced until the cubes of curd become slightly healed or skinned on the surface.

9. Heat should not be applied until 10 minutes after the stirring is commenced; and the temperature should be raised gradully to 96° or 98° Fahr. at the rate of about one degree for every four or five minutes.

10. Stirring should be continued until the curd particles are "cooked" so "dry," that when a handful has been pressed for a few moments, they will fall apart again as the result of any slight disturbance.

11. The whey should not be removed until the presence of acid is discernible by the hot iron test; and after that stage the curd should be ripened for the application of salt and hooping, in a period of time about equal to that which elapsed between the addition of the rennet and the removal of the whey.

12. Hand stirring *until the curd is firm* will improve the quality.

13. The stirring at first should be performed very gently and the temperature should be maintained above 94° Fahr.

14. The curd should be allowed to mat into one mass, but not until it has been stirred "dry." It is a better practice to stir the curd in the whey, until the development of acid is perceptibly advanced, (that is, until the hot iron test will show thread-like filaments about ¼ of an inch long), than to remove the whey earlier and then permit the curd to mat while it is in a wet state.

15. Close matting and packing of the curd are beneficial *only when the curd is sufficiently "dry,"* and when aëration is provided for.

16. The matted curd should be turned so frequently that the whey will not collect or stand in small pools in or on it.

17. If it becomes gassy or shows too much moisture, or if the acid develops too slowly, it should be aired, (if need be by grinding, cutting and stirring) and afterwards be kept at a temperature above 94° Fahr.

18. The gas of gassy curds hinders the development of lactic acid; and the presence of lactic acid prevents the formation of the gas which makes the curd porous. The treatment should provide for the escape of the gas by aëration and the maintenance of the temperature above 94° Fahr. in the curd, by the application of hot water to it, or of hot water or steam to the vat or sink in which it is contained.

19. When the curd begins to feel slippy, smells like fresh-made butter, has a texture somewhat fibrous or stringy in its nature and exudes tiny globules of yellow butter fat when squeezed in the hand, it should be put through the curd-cutter or grinder.

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20. After the grinding or cutting, aeration and cooling should be effected by the stirring of the curd for 15 minutes or more before the application of salt.

21. Salt should be added at the rate of 2½ to 2¾ lbs. per thousand pounds of milk, according to the dry or wet condition of the curd. A variation in the quantity of salt should be made, in order to allow for the portion of it which may be carried off in the whey from a wet curd.

22. The hooping should begin when the harsh surface, which is produced on each piece of curd by the action of the salt, begins to give place to a slippy mellow quality, or in about twenty minutes after the salt is stirred in. Sometimes the flavour is injured and closeness of body prevented by a delay at this stage.

23. Pure water only should be used in the bandaging of the cheese.

24. Shoulders or projecting edges on cheese are unsightly evidences of careless workmanship, and reduce their value from two to three shillings per cwt. in the British markets. Careful pressing and bandaging, and the turning of the cheese in the hoops in the morning will prevent their formation. The pressure should be applied gradually, and through the long lever about four hours after the curd has been hooped.

25. The cheese should be turned in the hoops every morning. No cheese should leave the press-room until the shape is symmetrical and the finish neat; and the press-cloths should be left on the ends of them.

26. If the press-cloths are removed from the ends of the cheese, clean whey-oil or butter (into which has been dissolved a teaspoonful of soda to a cupful of oil), should be applied hot.

27. The temperature of the curing-room should be kept continuously as near 65° Fahr. as is practicable.

28. Cheese boxes should not be stored in the curing-room, as the odour of the elm wood penetrates the cheese and affects their flavour. They should be strong, smooth, neat, and of the exact size of the cheese. A badly-boxed lot of cheese, or a lot of cheese arriving in England with boxes in a broken condition, realize from two to four shillings per cwt. less in consequence.

29. The weight of the cheese should be stencilled in neat figures on the side of every box.

30. The word "CANADIAN" should be branded on the side of every fine cheese and also on the box. The following cuts give illustrations of neat and suitable brands.

The letters may be ½-inch or ¾-inch size.

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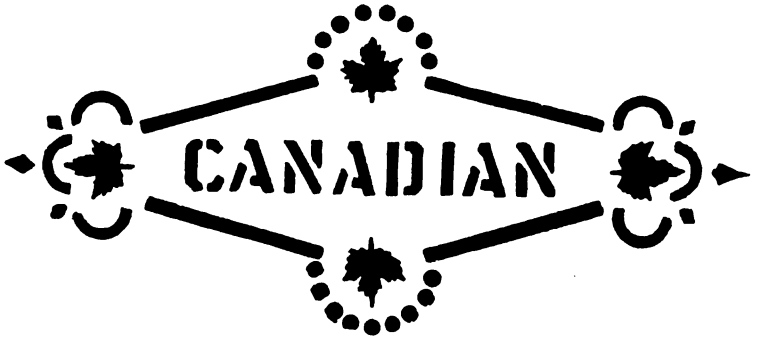


## NOTES FOR CHEESE-MAKERS FOR JULY.

July cheese, like July butter, has a reputation for being the poorest of the summer. This year it should be exceptionally fine. The abundance of grass in June, with a too plentiful rainfall, will leave the pastures with richer herbage than usual. Suitable conditions for the production, preparation and preservation of the milk in a fit state for the manufacture of fine cheese can be continued by the patrons giving effect to these simple requirements:—

1. Cows need the owner's providential care in the following matters, viz.:—

(*a*) An abundant allowance of succulent or other feed;
(*b*) Opportunity to drink pure water at least twice a day;
(*c*) Access to salt every day;
(*d*) Shade in the pasture fields from the weakening influence of July suns;
(*e*) Regularity in milking;
(*f*) Management and handling with continuous kindness, and an eye to profits.

2. Cows should be prevented from drinking impure water, and should be protected against the attentions of all dogs.

3. (*a*) Milk should be strained immediately after it is drawn from the cow;
(*b*) It should be aired by the use of an aerator, or by dipping, pouring or stirring;
(*c*) It should be cooled to the temperature of the atmosphere;
(*d*) It should be protected from contamination by the foulness of impure air.

It will be of quick and durable advantage to direct the attention of all patrons to these matters by sending to each a concise, clear and courteous reminder of duty in connection therewith.

When the yield of milk by the cows begins to shrink, the temptation to make up the quantity in some other way is increased. The Act passed by the Dominion Parliament to provide against frauds in the supplying of milk to cheese, butter and condensed milk manufactories is a piece of wholesome legislation.

It forbids the sending to any such factory (1) milk diluted with water, or (2) milk in any way adulterated, or (3) milk from which the cream has been taken, or (4) milk commonly known as skimmed milk, or (5) milk from which any portion of that part of the milk known as strippings has been kept back, or (6) any milk that is tainted or partly sour. The penalty for each offence against the provisions of the Act, upon conviction thereof before any justice or justices of the peace, is a fine not exceeding fifty dollars, and not less than five dollars, together with the costs of prosecution.

The fine when recovered shall be payable, one-half to the informant or complainant, and the other half to the representative of the factory to which the milk was sent, to be distributed among the patrons in proportion to their respective interests in the product thereof.

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Let every cheese-maker get a copy of this Bulletin published in the local newspaper, and further, let him see that every patron is furnished with a copy of that issue.

Some of the qualities that are expected and desirable in the cheese of July are:—

1. Rich, clean, creamy flavour;
2. Solid, firm, buttery body;
3. Fine, silky, flaky texture;
4. Bright, uniform colour;
5. Attractive, neat, symmetrical, stylish appearance.

In order that cheese having just these qualities may be manufactured regularly, I make the following notes for guidance:—

1. Thorough distribution of the rennet in the milk must be effected by diluting the rennet extract and by vigorous stirring.

2. Sufficient rennet to coagulate the curd into a state fit for cutting in from 35 to 40 minutes at from 86° to 90° should be used. When an extra quantity of rennet is used, a corresponding increase in the weight of salt should be added to the curd.

3. The contents of the vat should be perfectly still when coagulation commences. Vibration of the floor and of the vat during the thickening of the milk causes waste.

4. The horizontal knife should be used first in cutting; and active stirring should not commence until the cubes of curd become slightly heated.

5. The temperature should be raised gradually to 96° or 98° Fahr.

6. The stirring should be continued until the curd particles are so well "cooked" or "dried" that when a handful has been pressed for a few moments they will fall apart again as the result of any slight disturbance.

7. As soon as the presence of the acid is discernible by the hot iron test, the whey should be removed. In the case of gassy curds, a further development of acid before the drawing of the whey will be beneficial.

8. Hand stirring will be of advantage *until the curd is firm.*

9. The temperature should be maintained at or above 94°.

10. The curd should be allowed to mat into one mass.

11. It should be turned so frequently that whey will not collect or stand in small pools in or on it.

12. If it becomes gassy it should be aired (if need be by grinding and stirring) and afterwards kept at a temperature above 94°.

13. The gas formed in gassy curds hinders the development of acid; and the presence of acid prevents the formation of gas. The treatment should provide for the removal of the gas by aeration and the maintenance of temperature by the application of hot water to the curd or steam to the vat or sink in which it is.

14. Close matting and packing of the curd are beneficial only after the curd is sufficiently dry and when aeration is provided for.

15. When the texture of the curd becomes stringy in its nature, it should be put through the cutter or grinder.

16. Aeration should be effected by the stirring of the curd before the addition of salt. Usually 15 minutes of such treatment will suffice.

17. Salt should be added at the rate of from 2½ to 2¾ lbs. per 1,000 lbs. of milk, according to the dry or wet condition of the curd. A judicious variation in the quantity of salt should be made in proportion to the moist or dry state.

18. The "hooping" of the curd should begin when the harsh surface, produced on each piece of curd by the salt, commences to give place to a slippy, mellow quality.

19. Shoulders or projecting edges on cheese are unsightly evidences of careless workmanship, and lessen their value from 2 to 3 shillings per cwt. in the English markets. Careful pressing and bandaging and the turning of the cheese in the hoops in the morning will prevent their formation. The pressure should be continued for at least 20 hours. In that way cheese can be finished having an attractive, neat, symmetrical and stylish appearance.

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20. The sprinkling of cold water in the curing-rooms in the morning and just after noon will reduce the temperature.

21. The curing-room should be thoroughly ventilated and should be kept clean.

## NOTES FOR CHEESE MAKERS FOR AUGUST.

A cheese factory's reputation is largely determined by the quality of its August, September and October output. The beginning of August is a fit time for every cheese-maker who has had only partial success during the hot weather to redeem or improve his reputation and that of his factory. A comparison of the prices realized for the summer cheese of Ontario with the figures reported from the United States market shows that Canadian cheese are in demand at higher rates than American cheese will sell for. That we have gained in reputation and in market favour with British importers and consumers, is evident. That this advance and advantage are the result of the applied skill of not more than half of our cheese-makers, is well known to those who visit the factories and handle their products. To reach and to help speedily those who work in cheese factories without any ambition or aspiration for improvement is well nigh impracticable.

However, we desire to make helpful information not only attainable but unavoidable to such.

In a short time there will be numerous cable orders from England calling for "cool August cheese." That brief description implies a mild, rich flavour that may be preserved for the winter trade, a firm, solid body "full of meatiness," a fine outside finish, with clean, bright rinds, free from cracks, and bandages fresh-looking and not likely to appear mouldy.

To help the cheese-makers in manufacturing a class of goods that may be satisfactorily shipped on such orders, I call attention to some things both outside and inside of the factories which need their immediate and special personal care.

*Around the Premises.*—Insufficient or inefficient drainage facilities, unless enlarged or remedied, will show their worst effects during this month. At the cost of only a few hours of labour and a few dollars of expense, the immediate vicinity of every factory can be kept free from the noxious odours that arise from stagnant slop pools. The frequency and foulness of these about some factories are not only a menace to the permanent prosperity of our cheese manufacturing industry, but a disgrace to the men in charge of the factories.

At factories from which whey is drawn back to the patrons' farms in wagons, the leaking and spilling near the whey tank too often leave its vicinity in an almost impassable condition. A few loads of gravel will abate the nuisance and leave the place fit for approach during the succeeding months when the roads become bad.

The shrinkage in the milk supply will leave a shortage in the whey tank. In order that the whey may have more feeding value, the tank should be thoroughly cleaned and washed at least once a week.

At factories where hogs are fed, salt and ashes or common soil with the sod on it, should be fed liberally during this month.

*In the Making-room.*—This month seems the one when flies become most numerous and troublesome. Some afternoon after the cheese are in the hoops, it will be a good plan to close up the making-room windows and doors, and to burn a small quantity of sulphur for the purpose of fumigating the place. If a tablespoonful of alcohol be mixed with the sulphur, it will burn more freely. Care must be taken to prevent the fumes from getting into the curing-room. The tins of the milk vats and the insides of the sinks should also be washed afterwards before they are used. All vats, presses and utensils should get a thorough quarterly cleaning-up early this month.

Every cheese-maker should persistently fight untidiness and filth in every form; and he ought to have a woman's passion for cleanliness and a similar antagonism for dirt.

*In the Curing-room.*—There will be difficulty in curing the cheese made during July at a sufficiently low temperature. Ventilation of the room during the early

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mornings, as well as during the evenings and nights, will be of benefit. Floors should be sprinkled with cold water, morning, noon and evening. While the cheese are being turned on the shelves there should be an abundant admission of light. August is the month when the "skippers" are apt to do damage. A plentiful shaking of fly powder in the room before it is shut up for the day will make it possible to destroy the cheese flies by sweeping them up.

Cheese-boxes should not be stored in the curing-room. The odour from the elm wood penetrates the cheese and affects their flavour.

*Patrons.*—Since the milk is richer and less in quantity, there will be an increased temptation to "even up" by the addition of water, or to "even down" by the removal of cream. You will be doing the community moral service, as well as the cheese trade some good, by reminding the patrons that the Dominion Act on adulteration of milk is in force and will be enforced against all discovered delinquents.

Patrons are more likely during this month than at any other time to forget to provide salt for their cows, and to neglect to supply an abundance of pure cold water. Cool evenings are no excuse for the neglect of aeration of the milk. It should be most thoroughly aired immediately after it is strained.

The making of cheese for exhibitions is usually undertaken during the first two weeks of this month. Send a circular to every patron, making mention of those matters which are referred to in this bulletin, and inviting their co-operation, in order to aid you in the manufacture of cheese fine enough for exhibition and prize-taking. If some patrons pay no heed, and no improvement results, don't get discouraged. Keep right on insisting on a better state of things in their practice.

*Making the Cheese.*—When the evenings are cool and the milk needs ripening, don't fail to leave it in the vat until it reaches the proper state of maturity, before the rennet is added. Use enough rennet to coagulate mature milk to a state fit for cutting in forty minutes when set at 88° Fahr. Dilute the rennet extract to the extent of one pailful of water for every vatful of milk, and then mix it thoroughly by vigorous, rapid stirring.

When you are troubled with gassy curds, allow a development of acid, such as will be indicated by threads from the hot iron test a quarter of an inch long, before the removal of the whey. It is a good plan to run most of the whey off at an earlier stage, and to leave only enough whey on the curd to permit a free stirring of it. After the whey is drawn, air the curd thoroughly and make provision for keeping it warm. Let the temperature be kept above 94°. Frequent turning and aeration will facilitate the development of acid, providing the temperature is maintained. After the curd-cutter has been used, the curd should be stirred and aired for fifteen or twenty minutes before the application of salt. From 2½ to 2¾ pounds of salt per thousand pounds of milk should be added to curds which are fairly well dried by previous stirring. They should be put in the hoops within twenty minutes after the salt has been mixed in.

Pressure in the hoops should be applied very gradually. The cheese should be bandaged neatly when they are turned in the hoops, within two hours after they are put in the presses. They should again be turned in the hoops some time in the following morning. Cheese should be pressed for at least twenty hours.

Endeavour to get every one who sends milk to your factory, or who is concerned in its management, to try to bring it to the very front in point of reputation for the excellent quality of its product. Work conscientiously for that end, then talk up your factory wherever you go, and get your patrons to do likewise. In short, think and work to make your factory and its product worthy of a higher reputation, especially for August cheese.

## NOTES FOR CHEESE-MAKERS FOR SEPTEMBER.

1. Invite your patrons to co-operate with you in the effort to bring the September cheese from your factory to the very front at the World's Columbian Exposition in 1893.

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2. Urge them to see that the cows have an abundant supply of succulent, wholesome, nutritious feed, and access to pure water. When salt is not provided where the cows can reach it every day, they will drink foul and stagnant water if they can get it. Plenty of salt and prohibition from impure water will effect a double cure.

3. All the vessels used in the handling of milk should be cleaned thoroughly immediately after their use. A washing in tepid or cold water, to which has been added a little soda, and a subsequent scalding with boiling water, will prepare them for *airing*, when they may remain perfectly sweet.

4. Cows should be milked *with dry hands*, and only after the udders have been washed clean.

5. Tin pails only should be used.

6. All milk should be strained *immediately* after it is drawn.

7. Milking should be done, and milk should be kept only in a place where the surrounding air is pure. Otherwise the presence of the tainting odours will injure the milk.

8. All milk should be *aired* immediately after it has been strained. The treatment is equally beneficial to the evening and morning messes of the milk.

9. Some of the qualities that are expected and desirable in the cheese of September make are—

(1) Rich, clean, creamy flavour;
(2) Solid, firm, buttery body;
(3) Fine, silky, flaky texture;
(4) Bright, uniform colour;
(5) Attractive, neat, symmetrical appearance.

10. Use from 3 to 3¼ lbs. of salt per 1,000 lbs. of milk.

11. Put two bandages on each cheese, and finish them on the ends in such a manner that the outside one may be stripped off before the cheeses are put on exhibition.

12. In other respects follow the Bulletin of *Notes for Cheese-makers for August*, from which I take the following extracts:—

Patrons are more likely during this month than at any other time to forget to provide salt for their cows, and to neglect to supply an abundance of pure cold water. Cool evenings are no excuse for the neglect of the aeration of the milk. It should be most thoroughly aired immediately after it is strained.

The making of cheese for exhibitions is usually undertaken during the two first weeks of this month. Send a circular to every patron, making mention of those matters which are referred to in this Bulletin, and inviting their co-operation that they may aid you in the manufacture of cheese fine enough for exhibition and prize-taking.

*Making the Cheese.*—When the evenings are cool and the milk needs ripening, don't fail to leave it in the vat until it reaches the proper state of maturity before rennet is added.

Use enough rennet to coagulate mature milk to a state fit for cutting in forty minutes when set at 88° Fahr. Dilute the rennet extract to the extent of one pailful of water for every vatful of milk, and then mix it thoroughly by vigorous, rapid stirring.

After the whey is drawn, air the curd thoroughly and make provision for keeping it warm. Let the temperature be kept above 94°. Frequent turning and aeration will facilitate the development of acid, providing the temperature is maintained.

After the curd-cutter has been used, the curd should be stirred and aired for fifteen or twenty minutes before the application of salt. The curd should be put in the hoops within twenty minutes after the salt has been mixed in.

Pressure in the hoops should be applied very gradually. The cheese should be bandaged neatly when they are turned in the hoops, within two hours after they are put in the presses. They should again be turned in the hoops some time in the following morning.

Endeavour to get every one who sends milk to your factory, or who is concerned in its management, to try to bring it to the very front in point of reputation for the excellent quality of its product.

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## NOTES FOR CHEESE-MAKERS FOR OCTOBER.

A few years ago "October cheese" of Canadian make were deservedly in bad repute in the English markets. Their soft, porous body made them liable to go off in flavour quickly; they did not possess the keeping qualities, combined with that richness of body and flavour, which are so much desired by English merchants and consumers. During the last two or three years a decided improvement in the quality has been effected, and with the finer quality has come a better reputation in the markets. By the exercise of due care on the part of the cheese-makers throughout the remainder of this season, the reputation of our "October cheese" may be so well established that hereafter they will be counted equal to "September's." Cheese can be made as *firm* and *fine* during October as at any other time of the year. Suitable conveniences for controlling the temperature of the curd from the milk vat until the cheese is ripe are required.

### MILK.

The milk delivered at factories during October has a higher per cent of fat and other solids than during the summer months. Its flavour will be equally rich and nice, when the cows are stabled during the cold nights and fed liberally on fodder corn or any other suitable succulent nutritious feed. Turnip tops and rape should not be fed to cows whose milk is furnished to a cheese factory. After the milk is drawn it should be strained immediately and forthwith aired as thoroughly as during the hot weather of July. The aeration will improve its flavour and prepare it for the manufacture of a finer quality of cheese than it will be possible to obtain if that treatment is neglected. The milk should not be cooled below 60° Fahr. A milk-house or the farm kitchen will be a more suitable place for keeping it over night than the open milk-stand when the temperature of the outside air goes below 50°.

### CHEESE-MAKING.

The construction and equipment of the making-rooms of some factories are still defective. At the cost of a little labour and building paper, almost any room can be made so close in its walls that the inside temperature may be regulated at will by the use of a stove or steampipes. Thorough ventilation once every day should be secured. The following paragraphs will be of service in refreshing the experienced cheese-maker's memory and in instructing the others in the best practices.

1. Let the milk be ripened by the application of heat before the rennet is put into it. The ripening should be allowed to proceed to such a degree that not more than three hours will be required between the addition of the rennet and the development of acid perceptible to the taste or discernible by the hot iron test.

2. The use of sour whey to hasten the ripening should not be resorted to. Old milk which has become nearly sour to the taste may be added, but loppered or thick milk should never be used.

3. Rennet should be added in quantities sufficient to coagulate the curd into a state firm enough for cutting in from 45 to 35 minutes at temperature of 86° or 88° Fahr. It should be diluted with water to the volume of at least one gallon of liquid for every vat.

4. After coagulation is perfect the curd should be cut finer than during the summer. The application of heat should be delayed for 15 minutes after stirring is commenced; and the temperature should be raised to 98° and maintained at that point until the whey is drawn off. After the middle of the month a temperature of 100° will be preferable.

5. Care should be taken to so apply the heat and perform the stirring that the curd particles will be so dry, before the development of acid is perceptible, that after a handful has been pressed into a lump they will separate readily.

6. The curd should be stirred before and after the removal of the whey until the whey is so well separated out of combination with its particles that they produce a squeaky sound when bruised between the teeth or otherwise.

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7. After the whey is drawn off the curd should be kept at a temperature above 94°. If it becomes colder than 94° the development of acid will be hindered and excessive moisture will be retained in it during the souring process. The presence of such extra moisture in the curd at this stage will leave the cheese with a weak "pasty" or "tallowy" body, according to the degree of acid development permitted.

8. A cover over the vat or a curd sink with steam pipes seems a simple and effective provision for keeping the curd warm. Where no rack is used, the putting of a few pails of hot water in the lowered end of the vat will maintain the temperature.

9. Just after the removal of the whey, the curd should be hand-stirred until after the whey that will run has been drained off. *After the curd is dry and firm* it may be allowed to mat into one mass, *but not before that condition is reached.* All stirring should be performed so as to avoid wasteful bruising of the grain of the curd.

10. It may then be frequently turned and packed close, till the layers of curd are four or five deep. Whey should never be allowed to collect in small pools on it at this stage. The close packing in layers four or five deep, with frequent turning, prevents the outside of the matted pieces from becoming chilled or more deeply coloured by the action of the air than the rest of the curd.

11. The hot iron test is almost indispensable for determining with certainty, from day to day, the exact stage of acid development at which the whey should be drawn off. The filaments—thread-like processes—should be about one-quarter of an inch long. The proper degree of change for the cutting and salting of the curd has taken place when it feels mellow, velvety and "slippy," and shows a texture passing from the flaky or leafy into the stringy and fibrous. If it be too moist or soft, it should be cut or ground at a rather earlier stage and hand-stirred until dry enough, before the addition of salt. The most of the hand-stirring should precede the salting.

12. Not less than 3 lbs. of salt per 1,000 lbs. of milk should be used, and when the curd is on the soft or moist side, 3¼ lbs. per 1,000 lbs. of milk should be added; the 3¼ lbs. rate is also preferable during the latter part of the month when cold weather prevails.

13. Immediately after the application of salt the pieces of curd become harsh and gritty on the surface; then in from 15 to 25 minutes the harshness gives place to a mellow condition. At the second stage—and the temperature should not be under 88°—the curd should be hooped and pressure applied. Delay at this point or coldness of the curd destroys the desirable rosy flavour, and imparts to the cheese the bitter taste of the salty white whey.

14. Particular care should be taken to use only *pure* warm water when turning the cheese for bandaging, before the rinds are fully formed.

15. Especially in a cold press-room, pains should be taken to apply heavy pressure to the cheese before they are left for the night.

16. All cheese should be finished in symmetrical shape and kept in the hoops until the rinds are smooth and the edges free from any projecting "shoulders."

### CURING THE CHEESE.

The temperature of the curing-room should be kept as nearly regular at 65 degrees as possible. Where the September cheese are kept in the same room with those of October make, the latter should be kept on the warmer shelves. A slight chilling, after a cheese has been curing at 65° for two weeks, does little damage; but a steady temperature and constant curing give the best results. Bitter-flavoured cheese are usually the result of chilling in either the making-room, press-room or curing-room. If the cause be prevented, the consequence will be unknown.

### TO FACTORY MANAGERS.

As this is the last Bulletin of NOTES FOR CHEESE-MAKERS for this season, I desire to counsel the managers of factories to guard against tendencies that appear to menace the permanent success of our cheese industry, viz.:—

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1. The employment of inexperienced, incompetent men to manage the inside work of the factories.

2. The conscienceless cutting down of the remuneration of the makers, until the able men are leaving the occupation.

3. The inevitably penny-wise and pound-foolish policy of using factory furnishings of poor quality, simply because they happen to be a little lower in price.

So much additional trouble, loss, worry and disappointment result from the putting of men without aptitude or experience in charge of large factories that I strongly urge the proprietors to exercise the utmost care and caution, and invariably to inform themselves as to the fitness of an applicant by inquiry from a reliable expert or cheese buyer. No factory should incur needless risk of a loss of reputation, of patronage, of prestige, of price or profit.

## THE BABCOCK TEST.

*By Frank T. Shutt, M. A., Chief Chemist, Dominion Experimemtal Farms.*

In former publications* the accuracy of this test as a method for estimating the fat in the milk of creameries and cheese factories has been established. The principle involved by its use, viz., the payment for milk according to its percentage of butter-fat has also been shown to be a sound and correct one. As a natural result of the wide dissemination of these truths, every year marks the more extensive use of the Babcock test in paying for milk for butter and cheese-making. It is, therefore, the intention of this Bulletin simply to give directions to assist in the rapid and accurate working of the test.

The apparatus, consisting of centrifugal machine, test bottles, pipettes and acid measurers or burettes, should be purchased from a reliable firm, since it is absolutely essential to correct results that all should be well made and the glassware should be accurately graduated.

### THE MACHINE.

The capacity of the machine may be from eight to twenty-five or fifty bottles, according to the requirements of the factory. If driven by a handle or pulley, it should be geared by cog-wheels, and preferably of such construction as to hold the bottles, when not in motion, in an upright position. Where steam power is available, the whirler may be driven by a belt, or a jet of steam may be used as a motive power by playing it against tin cups $\frac{3}{4}$ inch in diameter soldered to the undersides of the disc of the whirler. In the latter case, the steam at the same time serves to supply the necessary heat to the bottles while the test is being made.

### THE GRADUATED GLASS APPARATUS.

The test bottles should be numbered by stamped brass or copper bands which encircle the necks. It will be found to greatly assist in reading the percentages of fat, if occasionally the graduations are made legible by rubbing in a mixture of lamp black and oil. The use of a pair of calipers or compasses facilitates the rapidity of reading the results, but the column of fat so measured should always be read from the same bottle in which the test has been made.

The pipette (17·6 c.c.) should be of a good length above the containing mark. This will conduce to ease and rapidity of measuring.

*The annual reports of the Dominion Experimental Farms for 1891, 1892; Dairy Bulletin No. 12; The proceedings of Ontario Creameries Association for 1891, 1892, etc.

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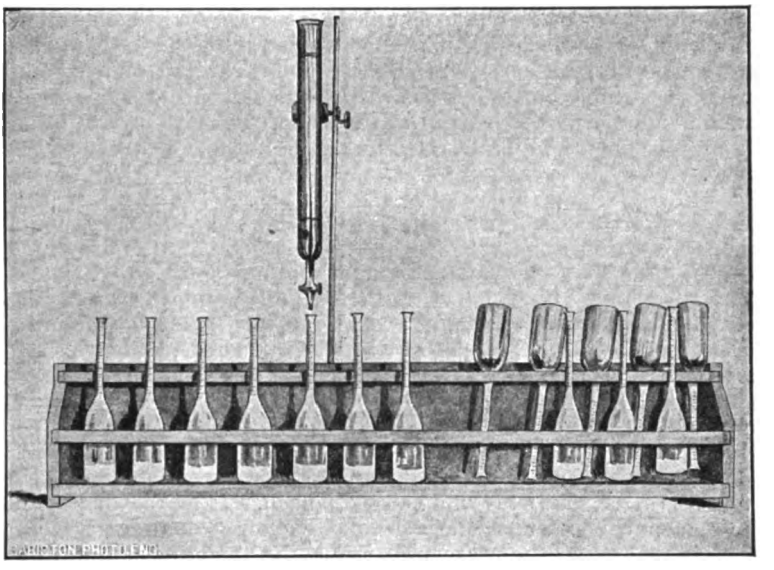
THE ACID MEASURER.



For factory purposes a burette, furnished with a glass stop-cock and holding 12 or more measures, each 17·5 c. c. of acid, will be found to economize time. Such a burette is marked at each 17·5 c.c. and is held by a support of firm and substantial make. (See illustration.)

A can holding 1 quart or so of hot water for filling up the bottles should be conveniently placed and furnished with a rubber tube possessing a pinch cock and terminating in a small piece of glass tubing drawn out to an opening about $\frac{1}{16}$ inch in diameter.

THE ACID.

The sulphuric acid (oil of vitriol) should be purchased of the strength of Sp. Gr. 1·82 or 1·83. If stronger than this, somewhat less than the standard quantity should be used and the acid allowed to remain in the test bottle containing the milk, ten minutes or so before shaking. Dilution of the acid is not recommended. If the acid is weaker than the strength above stated, more of it than the standard measure will be required. To economize in the expense of testing, the acid should be purchased by the carboy. A word of caution may here be added. Sulphuric acid is extremely corrosive. If by accident any gets on the skin, it should at once be wiped off with a clean cloth and the part bathed immediately with a large quantity of cold water. A bottle containing carbonate of soda or ammonia should be kept in a convenient place to neutralize any acid that may be spilled upon the clothes or table.

An additional and indispensable piece of apparatus is a wooden rack to hold, say, 12 bottles. (See illustration). By its means the acid and milk may be thoroughly mixed in a large number of test bottles at once, by a motion easily learnt by practice.

SAMPLING THE MILK.

It is important to obtain a thoroughly representative sample. This may be procured in various ways.

When the test is completed daily, the 17·6 c.c. may be measured directly into the test bottle and the number of the latter recorded against the patron's name.

For semi-weekly or 3-days' test, a pipette measuring 5·90 c.c. is used, and as in the above, its contents should be run at once into the test bottle.

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For composite tests of one week, a small dipper, holding about 35 c.c., on a long handle, may be used to stir the milk and take the sample from the weigh-can.* The milk being poured into the weigh-can, and consequently well mixed, the small dipper full is put into the patron's composite sample bottle. The whole operation occupies but a few moments if the bottles are placed conveniently to the weigh-can.

This method secures a representative sample of the milk as daily supplied.

The composite sample bottle here referred to should have a wide mouth, and be furnished with a stopper or other tight-fitting contrivance to prevent evaporation. Its capacity may be about one pint. It should be labelled conspicuously with the patron's name.

### THE COMPOSITE TEST.

The patrons' milk may be examined for percentage of fat daily, semi-weekly or weekly. The latter involving the use of the composite test is by far the cheapest and most economical plan, since it entails but one measuring of the milk and one measure of acid per week for each patron; fewer graduated test bottles are required and, as far as our experience shows, the results are fully as accurate as by the more frequent testing.

The preservative here recommended for keeping the milk in a fluid condition is potassium bichromate, a yellowish red crystalline substance. The material although poisonous does not possess such highly dangerous and corrosive qualities as do the preservatives, corrosive sublimate and caustic potash. It moreover has the advantage over these chemicals of imparting a decided yellow colour to the treated milk, whereby error in mistaking the preserved sample for one of normal milk is guarded against. The potassium bichromate should be purchased in a powdered condition and costs retail about 25 cents per pound—a quantity sufficient for 1,000 to 1,500 composite tests. A small amount of the powdered bichromate is put in each sample bottle. The exact quantity is of no moment; from three to seven grains is enough, and this can be measured on the point of a knife or in a small spoon with sufficient accuracy.

The milk from the small dipper is now run into the patron's composite sample bottle every day. It at once dissolves the bichromate and assumes a strong yellow tint. Before adding successive samples, the bottle should be gently shaken with a rotatory motion, so that the risen cream may again become thoroughly incorporated. This is essential if an average sample is to be obtained. These bottles should be kept in a cool place, though not necessarily on ice. After the addition of the milk on the sixth day, the 17·6 c.c. pipette full for the test bottle may be withdrawn.

### THE USE OF THE PIPETTE.

For a daily as well as a composite test, the 17·6 c.c. pipette is used. The pipette is filled by suction and the level of the milk in the stem carefully lowered to the containing mark by gradually releasing the pressure of the finger which closes the upper end. The milk is then allowed to run into the test bottle.

### THE TEST.

The bottles being placed in the rack, before mentioned, each receives from the pipette the standard quantity (17·6 c.c.) of the well sampled or composite milk, and

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*An alternate method for sampling for composite work, is as follows:—The milk is taken from the weigh-can by means of a tin tube, open at both ends, and of such a diameter that it can be conveniently closed with the finger, about 5-16 inch. Its length should be about equal to the depth of the weigh-can. At two inches from one end a gradual constriction is made—similar to that of a pipette—until the orifice is about 3-16 inch in diameter. This will be the lower end of the tube, the constriction preventing the milk from running out before the finger is removed. The tube is inserted and allowed to touch the bottom of the weigh-can; the finger closes the upper end and the tube is withdrawn. The contained milk flows into the composite sample bottle by simply releasing the finger. The sample so obtained is in direct proportion to the amount daily furnished, thus ensuring greater accuracy in the final result than when an equal quantity is daily taken.

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the number of the bottles is recorded against the patron's name on the printed form, now to be obtained for that purpose. The acid is then run in from the burette. The milk and the acid in the twelve bottles are now to be thoroughly mixed by shaking the rack in the manner before stated. This is repeated until enough bottles to fill the whirler have been filled and treated. The bottles are now placed in the centrifugal machine, and whirled for four minutes. If any delay has occurred before the whirling, hot water should be placed in the machine, unless a steam jet is used as motive power. After the first whirling, *hot* water is added carefully to the contents of each bottle, till the column of fat is within the graduated portion of the neck, when they are again whirled for 1½ minutes. During the final whirling the temperature in the bottles should not be allowed to fall.

The column of fat should be at once noted, and its percentage recorded. If it is not found convenient to read the fats immediately, the bottles should be immersed in hot water above the level of the fat in the necks for several minutes previous to measuring the fat. The readings will be found quite as clear and free from curd in the bichromate composites as in the fresh milk test; indeed, as a rule we have found less trouble in obtaining clear readings in the former than in the untreated milk.

A time-saving method for emptying the test bottles (which should be done as soon as possible after the percentage of fat is recorded) is to invert them over a sink or pail by putting the necks through holes in a board, the diameter of the holes being such as to easily admit the neck only. A little pearline or soap in the rinsing water will free the necks from any film of fat and leave them bright and clear for future tests.

### THE CALCULATION OF RESULTS.

To obtain the number of pounds of fat furnished in any given time by a patron, multiply the pounds of milk supplied by the percentage of fat and divide by 100.

For creameries and cheese factories, the method of calculating the amount due to each patron may be as follows:—

Deduct the cost or charge for manufacturing from the amount realized from the sales of the butter or cheese, then divide the result by the total number of pounds of butter-fat supplied to the creamery or factory during that period, and the price of one pound of butter-fat is obtained. Multiply the number of pounds of fat furnished by the patron, by this price, and the result is the amount due him.

### EXAMPLE.

| | |
|---|---|
| Total weight of milk received | 6,525 lbs. |
| " cheese manufactured and sold | 621·4 " |
| Proceeds—at 10 cts. per lb. | $62.14 |
| Amount to be deducted for manufacturing (2¼ cts. per lb.) | $13.98 |
| Amount to be distributed | $48.16 |

Milk supplied by the patrons A, B and C, as follows:—

| | Lbs. | Per ct. fat. | Lbs. of fat. | |
|---|---|---|---|---|
| A. 1st week | 500 | 3·0 | 15·00 | |
| 2nd " | 550 | 3·3 | 18·15 | |
| 3rd " | 525 | 3·1 | 16·27 | |
| 4th " | 600 | 3·5 | 21·00 | |
| Total lbs. of fat supplied by A. | | | | 70·42 |
| | Lbs. | Per ct. fat. | Lbs. of fat. | |
| B. 1st week | 500 | 3·7 | 18·50 | |
| 2nd " | 550 | 3·9 | 21·45 | |
| 3rd " | 525 | 3·5 | 18·37 | |
| 4th " | 600 | 4·0 | 24·00 | |
| Total lbs. of fat supplied by B. | | | | 82·32 |



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| | Lbs. | Per ct. fat. | Lbs. of fat. |
|---|---|---|---|
| C. 1st week | 500 | 3·8 | 19·00 |
| 2nd " | 550 | 3·3 | 18·15 |
| 3rd " | 525 | 3·5 | 18·37 |
| 4th " | 600 | 3·7 | 22·20 |

Total lbs. of fat supplied by C..... 77·72

Total lbs. of fat supplied by A,B,C..... 230·46

$\frac{48·16}{230·46}$ = 20·897 cents price of butter fat per lb.

A. 70·42 × 20·897 = $ 14 72
B. 82·32 × 20 897 = 17 20
C. 77·72 × 20·897 = 16 24

$ 48 16

## PART VI.—LECTURES AND ADDRESSES.

### (1.) A FEW ECONOMIES IN FARMING.

*(Report of an Address delivered before the Central Farmers' Institute of Manitoba at Portage la Prairie, June, 1892.)*

MR. MAYOR, LADIES AND GENTLEMEN,—It may seem to you a very steep tumble to come from the "Ideal Farmer" down to talk upon economy; but the ideal farmer is an economical man, else he is not a wise man. Many men think that because the ideal is high, it is not worth striving after; and one of the main calamities of middle life is when a man lets go the ideals of his boyhood and is both willing and anxious to lower them in deference to some one's flattery or hostility, be he a friend or a foe. I would call on all the young men here, and those who will hear me through the reporter's pen, never to lower their ideals of manhood, but to try and realize them to the full. If they come short of the mark, they will at least have gone higher than if they had no ideal at all.

Coming to the town of Portage la Prairie by crossing those beautiful plains, I find myself in rather an embarrassing position when I begin to speak upon the subject of economical farming to the people who dwell here. I will explain, perhaps, later on, whence the embarrassment comes; but the people of Manitoba have such an excellent opinion of themselves as a whole, that these most excellent people of Manitoba whom I address to-night may already be exalted in their views of their own merits. I was speaking to an audience yesterday in Virden, Man., a grand audience, such a one as warms the heart of a man who wants to tell the people something they want to hear. They were a people full of interested enthusiasm (and I believe if the people are wisely enthusiastic about their own work the good Lord will make the sun to shine enough to ripen the grain before the frosts come). But to-day I feel like a certain clergyman who had come from a long distance to preach the gospel to a fashionable congregation in Ottawa, who seemed to be very devout. As he looked around the church he thought that things even in Ottawa are not always as they seem, and so he said that he felt it most embarrassing to endeavour to preach the old gospel of repentance to such a congregation, as they looked so eminently respectable, probably they had too high an opinion of themselves already. He would not call it self-righteousness, and you can interpret the meaning and apply it to other questions if you like. I think it might apply to some of the self-satisfied farmers who farm the beautiful plains of Manitoba. I am very glad to reciprocate all you, Mr. Mayor, have said in your words of welcome to the farmers to this town hall. If the people who live in the towns would recognize

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more fully the identity of interests between farmers and themselves, they would help themselves by forwarding the interests of agriculture. The farmers in turn would help them to make more money, and both would obtain more pleasure out of life than they have now. The prevalent opinion is that their interests if not hostile are at least not harmonious. The interests of the town and the country are almost identical. The townsman has goods to sell to men who have to pay for them out of the wealth of their crops; and just as farmers are trained and taught to produce more wealth so will the townsmen have a better chance to share in the possession of it. When the people of the towns neglect the people of the country, they neglect their best friends and interests. They should take more interest in the success of the farmers. Farmers themselves should rub together oftener and have their minds sharpened in that way as to the best means of attaining success in their calling. I think my mission is to harrow up your minds, and if I can, to say something that will stir you up to kill the mental and other weeds, and make better crops come hereafter as the result of your good thinking.

Economic farming is a subject that is especially apt to Manitoba, because agriculture is all important here; you have nothing else to depend upon. In Ontario they have lumbering interests, mining interests, manufacturing interests, shipping interests and many other interests, so that if farming should fail for one year, they can fall back on other sources of revenue and wealth; but when the farming fails here, it is calamitous failure indeed because you have no other resource. This being so, every man who wishes his province well should give some thought to its needs and how they can be met. I would like to see more of our boys who have splendid minds and who go to study law, stay on or come to the farm, not to wear the skin off their hands, but to wear down their brains in thinking for the best interests of the farmers. These would be the nobility of this people. A shop-keeper in Manitoba has little chance of escaping failure should the crops around his town or village fail; the machinery manufacturer or seller has small chance of meeting his obligations unless the crops meet the farmer's expectations. For the prosperity of the country as a whole, you will see that it is most important for the farmers to learn to carry on their work economically.

Farming here and elsewhere is largely concerned in the production of wealth. I have handled in one mouth, thousands, and thousands of dollars worth of farm products in business, but in handling them I never created a dollar's worth of wealth. You may handle wheat, butter and cheese, and the oftener you handle the product the more you increase the cost to the consumer, but the real worth, the life sustaining value has not been augmented. The man who is not in close contact with the sources of wealth, may be acquiring a great deal of wealth, but he is sometimes a man who does not create any wealth. One of the embarrassing things in a man's experience will be to account, by and by, for owning a great deal, when he has made nothing—to account for possessing a great deal, having produced nothing. I would not like to undergo St. Peter's examination in that way, and worth a million, unless I had created it or earned it by the work of my brain or my hands. It is better to give largely to the world even if you have not much left, than to get largely from the world and give nothing back. Life is not always what it seems, and for true noble mindedness, give me the man who creates or makes or produces; such a one as goes through the world serving it and leaving it better than when he found it.

The object of farming is to create wealth for food and clothing. The farmers are entitled to a fair share of it for their own comfort. They provide the wool, cotton, silk, and leather from farms, and in this way furnish the raw material with which to clothe the world as well as feed it. You cannot find more than a few names, and I cannot think of any at the present moment, of men who stand out, glistening from the large beneficial service which they have rendered during the past ages who did not come from some country or humble home. Think back over the list and find out where the boys came from. You can get good crops only from good seed. It will always be so in farming and in life.

As to furnishing food and maintaining fertility, a great many farmers fail in their calling in this respect. They furnish lots of food for a time, but when they



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abstract the fertility from the soil, by and by only a portion of their farm will give a fair return for their honest toil. A farmer must fully understand the nature and needs of his business to be enabled to create more wealth, live honestly and leave his farm better than he found it. In following farming along that line a man must follow it economically. I wish to emphasize that word "economy" because the very munificence of your inheritance in this western province has given you large ideas and has made you men who contemn small things. The enterprising and self-reliant of our people have come west; you have had the flower of the population of Ontario come to Manitoba and the North-west Territories, and because you are such you are men of large ideas, sturdy and indomitable. If you had not been such, many of you would have left Manitoba during some of your bad years. And because you are such, you think that economy does not become a people like you. But economy is not meanness, and a man who is not economical will be compelled sometimes to be mean against his will. A wise administration of all that a man can control is economy. Meanness is trying to hold on to two cents so tight and so long that the hands become too numb to do any good work in the world afterwards. Economy means exercising control, but very often a farmer looks down upon himself as a nonentity that is controlled by every ebb and flow of circumstances, and not as a man who should control circumstances and rule over the things that are put under his power. Go back to the very beginning of farming, take the sacred story or the scientific supposition as you choose, you will find that man was given or acquired dominion over the earth that he might rule over it; and the man who farms wisely, says to his plant, grow, and it grows beneficently, if he is a big enough man in his mind to make it grow thus. If he is a mean man, it will be a mean looking plant like himself. When a says to a plant, grow, and it grows, the plant lives, moves and has its being in that man's thought; and if he does not think well enough and far enough to have a good seed-bed and have a seed adapted to the climate and soil, it will not do well. But if it lives, moves and has its being in his thoughts, and his thoughts furnish a suitable and adequate environment, then it will respond. A farmer can never feel quite so much a man in every fibre of his being, as when he tries to control life. It is not so hard to take a dead block of marble and chip it into a thing that looks like something that once had life; but when a man tries to make a horse take form after the ideal of his thoughts, he is doing a higher and nobler kind of work, requiring more mind if less muscle. If you go back and find the best "No. 1 hard" wheat, the best steer, the best cow or horse in your stables, you will find behind all the excellencies of all these products and their anterior processes, some one's clear thinking. You can see how important it is to a man to think well of what he is striving to do, to have a high ideal, and to devote himself ardently and arduously to its attainment.

In Manitoba, men have good minds. If you discuss provincial politics with a Manitoban, he will display a mind that is sharpened down to a razor edge to cut through any argument opposed to his party; if you discuss Dominion politics, the same man's mind is like a razor that has been sharpened so much that the edge has been turned until it does not cut so well; and if you chance to discuss farming with him, his mind will be like the knife used by the harness makers, keen and sharp at one end for politics, but at the other end for farm topics, dull as a hoe.

Now if men would come to a meeting like this and listen and take part in such a discussion as that which took place this afternoon, you would find that the friction of mind on mind would sharpen up their thinking and ideas. The farmer should not believe everything he hears, and the object of the Farmers' Institute is not so much to load a man with information as to rub his mind up on matters pertaining to his own business. Farmers should meet with their fellow farmers to discuss their common business and its interests.

I will give you an illustration; I went down to Nova Scotia once on a mission in connection with agriculture, and I went to a place where they were making the steel parts of agricultural implements; I saw a vast furnace filled with molten steel bubbling and spluttering like lard in a frying pan. The men who were managing the steel works could lead that steel through the prepared ducts into certain moulds

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and the steel took shape according to the thinking of the men. I have seen men in all occupations of life whacking cold steel with their knuckles and having sore hands for their pains while the steel did not budge. They should have whacked and worked it with their minds first, and then it could be led where and how they listed. In Manitoba men must not only break the land with their ploughs; they must also break it with their minds. Money is made in farming first in the man's head and then in the man's fields and then in his stables. The man who neglects to use his head as well as his hands cannot hope to be successful.

In economical farming a man should economically administer his time. I have known men so busy that they would never *waste* half a day in going to a farmers' meeting; so busy cutting firewood that they never *wasted* half an hour in sharpening the axe, and in consequence have hard tired muscles and badly cut firewood. If you would come together in Manitoba once a week and talk agriculture, you would find the practice of the whole province responding to clear thinking. I could not give you any advice that would help Manitobans more than to come together once a week and discuss the merits of the different methods of farming, and thus settle for yourselves things that have not been explained as yet. I was staying at a nice home the other day and talking to a farmer's wife, a large-hearted, clear-minded woman, and she said, "We get along pretty well up here, but we have nothing at all in the way of social intercourse, except at the church and the prayer meeting," a pretty one-sided social life even if the sermons were good and the prayer meeting service devotional. A farmers' meeting once a week would give a new stimulus to things around the farmhome, and furnish material for the conversation of the family at the meal table. Too often now life is so dull for the lack of interesting diversity that if I had to live in such a house where there were no new subjects for conversation and everything had a monotonous nature, I would attain to dyspepsia in three days and want to die and thus realize upon the hope of going to heaven inside of a week. I am telling you the truth, the sober truth when I say that the people of Manitoba have been in such eager haste to get rich by getting big crops of wheat, that they have seldom a bright, helpful idea for the home breakfast table unless company be present. Did you ever see a woman sit down in a chair and cry, saying, "We have been here six years and have been hoping ever since"? Well, hope deferred maketh the heart sick, and many a good woman has wished herself well back in Ontario because the farmer was bound to have a large crop of wheat that did not always come, and because he did not fortify himself by having something else to depend upon. I have seen such a sight in Manitoba, and though I did not go down to Ontario and advertise it, still I have seen it, and the farmers here should awaken to an economical management of their business, and have other resources besides wheat and thus brighten up their homes so that the families will be really happy as well as well-off.

It is economical to try and bring about good times. They come between the income and the outlay. If a man's income is very much more than his outlay he is very well-off. But if his outlay creeps up to and is more than his income, times are very bad with him financially. If a man can reduce his outlay with economy then he helps to bring about good times. It is economical to try and reduce the outlay in farming.

One thing that strikes a stranger coming into this country (although I am not an entire stranger here) is the way you allow your machinery to be exposed to the weather during all seasons. The impression is at once formed that you have too many farm machines. Many machines by being exposed to the weather for a whole season will lose twenty-five per cent of their value. I have seen them standing out in all weathers where there was lots of straw lying around which could have been utilized as a shelter for them. It is a plain truth, and one I should like the people of Manitoba to bear in mind, that the atmosphere here is bad for the machinery thus exposed. The result is that in a short time you have to trade your machine off for a new one, losing a great deal in the bargain. I have no spite against the machinery manufacturers; I think they are the benefactors of the country; but still you should protect your own interests by protecting your machinery.

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You can be economical by trying to increase your income. Manitoba wheat was quoted yesterday from eighteen to fifty-seven cents per bushel. I do not know but that there may be some means whereby you could get more than fifty-seven cents a bushel if the railway rates were lower; but this I do know, that any man, if he is man enough for his business, and I do not say that every man is equal to that, but if he is man enough he can lift himself up from being the eighteen-cents-a-bushel man to being a fifty-seven-cents-a-bushel man by controlling the quality of his product.

Some men use their soil after the manner of a boy in Ontario who set a hen on twenty eggs. His father said, "Johnny, do you think she will hatch them all?" He answered, "No, papa, I simply wanted to give the old hen a chance to spread herself." I have known men here get more land than they could properly attend to, that they might have more than their neighbours. It is not a wise administration of the soil for a man to put in more crop than he can handle. It will even pay better to have eighty acres of grain crop with three tons of manure to the acre than to have one hundred and sixty acres of crop without any manure at all, and a third of the crop no good. Three tons of manure will put back into the soil as much strength or fertility as one ton of wheat takes off.

It is economical to remember that cultivation of the soil is for two purposes, and because a man fails to discriminate between the two and bear them in mind he gets into a quandary as to whether he should plough in the fall or the spring and cultivate deep or shallow. Cultivation is primarily to prepare a seed bed, and the seed bed is most perfect when the soil is very compact except the top two inches,—that is for wheat. At the same time a farmer should remember that the cultivation of soil is to kill weeds, and by bearing these two objects in mind, he can do both, kill the weeds and have an excellent seed bed.

A man should exercise economy in the selection of seed grain. I would like to draw this distinction, for fear that it has not been made clear to the minds of the people of Manitoba, that good seed is quite a distinct commodity from good wheat, although they may some times appear to be identical. The millers have been running the seed question in Manitoba rather too much. The miller wants wheat to make flour and the farmer wants seed to get a good crop that will ripen in his locality. Sometimes through want of thought he sells the wheat that would, if sown, bring forth an excellent crop, and sows the wheat that would have made excellent flour. Last year over sixteen thousand sample bags of grain were sent out from Ottawa under the direction of Prof. Saunders, for the purpose of inducing the farmers to examine for themselves the merits of the different varieties for seed in the several localities.

It will pay a man to grow the crops he can sell best; and a man can sell frozen grain all right if he administers his materials to the best advantage. He need not try to grow frozen wheat; he should try to grow the crops he can sell to advantage, and he should make provision for selling every kind of crop which grows in Manitoba.

You have not the same sad history here that some districts have, by being injured to some extent by the frost three years out of five. However, a little economical farming here will help the farmers to market to advantage even a crop of inferior grain damaged by the weather. There was some frozen wheat in Manitoba last year, as you know, though I believe you were wonderfully exempt in this district. We had some of it sent to Ontario. I said once in the innocence of my moss-back condition (that is what I was called when I first came to Manitoba, and I have not recovered from the ailment since; further west I was called a "tenderfoot" and I still think it is nice to be tender in one's feelings in some respects) but because I said, in the frankness of uninitiated candour, that I had seen some frozen wheat once in Manitoba, some one sent to Ottawa for Professor Robertson's benefit, a request that he be asked, officially, to give a contradiction of his previous statement. They forgot that Professor Robertson was a Scotchman, and like most of that nationality, "lived only to tell the truth and set a good example." We had some frozen wheat taken to Ottawa last year, and I will tell you what it was sold for net, after deducting the shrinkage. It was sold for eighty-two cents a bushel, and no one was duped. It would not fetch here now more than eighteen or twenty cents a bushel. Every bushel of that wheat

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could be turned into from nine to fifteen pounds of pork, live weight, and that could be sold for five and a quarter cents per pound, less a shrinkage of five per cent. That makes it practicable to realize seventy-five cents a bushel for frozen wheat.

The farmer by properly administering his crops, by preparing to market them, not always in bags, but sometimes in beasts, can get a good price for an otherwise unsaleable article. Then we had some excellent beef from feeding steers on corn ensilage and frozen wheat. I had a dozen roasts sent to my friends and they pronounced the meat as excellent as any they had ever tasted. The steers fed on corn ensilage and frozen wheat cost the least per day of any we fattened, and they gained one and three quarter pounds each, per day. We found frozen wheat for the fattening of cattle to be quite equal, pound for pound, with any other grain. As a further precautionary measure in the districts subject to fall frosts, by the growing of more barley and less wheat, farmers would derive a good income from their bacon, butter and beef, and would have more number one hard wheat to sell.

It will pay the farmers of Manitoba to conserve the fertility of the soil. If a man with a bank account keeps chequing out without making deposits to his credit, in a short time the balance will disappear. In like manner if you go on continuously sowing and selling wheat, your fields will become broken hearted and exhausted, and make you like themselves. The following table shows the quantities of the three essential elements of fertility which are removed in one ton each of different farm products.

Nitrogen, phosphoric acid and potash in one ton each :—

| | Nitrogen. | Phosphoric Acid. | Potash. |
|---|---|---|---|
| Wheat | 41·6 lbs. | 15·8 lbs. | 10·4 lbs. |
| Barley | 32· | 15·4 | 9· |
| Oats | 38·4 | 12·4 | 8·8 |
| Pease | 70·6 | 17·2 | 19·6 |
| Beans | 81·6 | 23·8 | 26·2 |
| Indian corn | 32· | 11·8 | 7·4 |
| Hay | 31· | 8·2 | 26·4 |
| Clover | 39·4 | 11·2 | 36·8 |
| Potatoes | 6·8 | 3·2 | 11·4 |
| Fat cattle, alive | 50· | 31·2 | 2·8 |
| Fat sheep, alive | 44· | 22·6 | 2·8 |
| Fat swine, alive | 34·8 | 14·6 | 2· |
| Cheese | 90· | 23· | 5· |
| Milk | 10·2 | 3·4 | 3· |
| Fine butter | ·5 | 0 | 0 |

It takes more than one hundred tons of butter at $400 a ton to carry as much from your country as one ton of wheat. One hundred tons of butter will carry less out of Manitoba, away from the province than one ton of wheat that brings back $20; therefore why not try to conserve the fertility of your soil and sell what takes least out of the land and brings back the most to your own pockets? It will pay you to reduce the percentage of value absorbed by transportation. The ethics of corporations is not, "as ye would that others should do unto you," but, "just as much as the traffic will stand." It does not necessarily cost any more to carry a tub of butter to Montreal or to Britain than to carry a bushel of wheat. The butter may fetch you $12 against 60 cents from the wheat.

Then there is economy in the care of cattle. I need not explain to people living in the natural home of the buffalo that you have a soil admirably adapted to the animal health. In one district a man came to me and said there were three hundred cows and calves dying this spring, not from disease, but from the impoverished condition of the animals. They were so tired out trying to live on a scanty supply of dry food that they laid them down and died. That reminds me of a story told by an American who in speaking of the poor condition of the cattle in his state, said their hides were so dry that they had to hire a boy at $10 a month to oil their joints

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to keep them from creaking while going to water, and in the spring all the men in the neighbourhood sold cow hides for a living. Succulent feed of some sort through the winter is a panacea for the ill condition expressed by the term "hide-bound." Where roots grow so well a supply of them or corn ensilage should be provided.

Then in the economical production of butter, it will always pay a farmer to remember that butter is merely a kind of food whereby a man obtains energy for work. If I move my arm I rub off some of the material of my muscles—the friction has worn some off. I need something in my food to repair the waste of tissues in my body; besides, I need a supply of energy that will make it possible for me to originate and continue motions and perform the functions of living. There is nothing in fuel that will repair the waste of the cylinder of an engine, but without the fuel you could not get the motion. What does that mean? You get all energy in all food and fuel from the old sun. He streams his rays down on the earth and on and into the plants, which the soil carries. He rolls his strength up into plants, as I might wind my strength into the spring of my watch. A plant may then become food and fuel. It is economical practice on the part of the farmer, to elect for his fields, the plants which can serve him best in that capacity. The sun can store more of his energy during a single season's growth into the corn plant than into any other plant that grows easily in Canada. A corn stalk furnishes to the cows more energy than any other plant. Then you get this energy transmuted into butter, and you have "materialized sunshine," energy to supply force for your work. There is economy in that method of getting the sun to serve you by means of cornstalks, cows and butter. For this reason I think that every man who helps to make a farmer have increased faith in the value of cornstalks, does a service to his country. The wealth of the western states has come practically from two sources—from the sun and from the minerals—from the sun through the cornstalks, which in various forms of derivative diet has furnished the energy to dig up the minerals. You need not try to "bamboozle" yourselves into thinking that wealth comes into existence without somebody's effort.

Then in the production of excellent butter, the farmer needs to have good cows. I have a great deal of respect for a good cow. I have a good deal more respect for some of the cows in my stable than I have for some men. If you treat a cow properly she will give back an equivalent for what she gets. She is, therefore, honest and will pay her way through life. I will hunt with a microscope in the careers of some men to see what they have given to the world of valuable service and I cannot find it. A cow sometimes does get more than she gives. I would not spare that cow. Put her on the block; get your money out of her in that way. You think of cows as boarders, kept for the profit of the man who keeps the boarding-house. Did you ever think of a man keeping a boarding-house, running on the general satisfaction plan, saying that if he does not get enough from one boarder to pay for his keep, he will get it from the others? No; he expects to make a profit on each one of them. The farmer should act in that way towards the cows. There is advantage from watching the cows and selecting the best of them. It is not so very hard to do and most cows are capable of paying for their board in full, if they are given a fair chance. But if they are brought up the wrong way, they are sure to go astray—just like boys.

Some people have a preference for a large cow. To my mind if I wanted a cow to consume more food than she would give a return for, I would like an immense animal. If I wanted her to pay for her board, I would just as soon have a small one. I believe I would rather have a small cow than a large one, if she will give the same quantity and value in her milk. Then there is a notion that the bigger the cow, the better the quality of her milk. This is not so. I have faith in the quality of goods done up in small packages.

It is possible for a farmer, by judicious selection and feeding, to enlarge the capacity of the cows in his herd. Mr. George Allan, who lives near Ottawa, is an excellent farmer. He had four cows in 1888, which gave only seventy-eight pounds of butter each. He began to grow cornstalks, and feed these with a little bran, and in 1889 they gave 131 pounds each, and in 1890 his cows gave him 204½ pounds of

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butter each. See the enlargement of capacity, and therefore an economical production. It is possible to enlarge the capacity of the cow and thus reduce the cost of production. That belongs to economy, and the wise man is economical always, because to be otherwise is waste; and waste is worse than folly.

Economy in the production of butter involves doing something during the long winter season. I know very few men who get all they want to get, by working five months in the year. Most of us have to work twelve months in the year. I would have my cow work as long as I have to work myself. If you make a heifer with her first calf milk ten months, you create the tendency in her to keep that up, and in a short time you will have established a habit which will be transmitted to the progeny. I will find you herds of cows where they do not go dry at all. You may take these few facts away with you, that if the cow begins the milking season in the fall of the year instead of the spring, she will soon give thirty per cent more milk within the twelve months; she will give you milk during the winter, when it is worth on an average, fifty per cent more money; (and by the closest kind of calculation, it does not require more than twenty-five per cent more food to keep her milking than dry, if kept in proper condition in both cases); it will make it possible to keep a large number of cows on the same farms. Cows milking during the winter will provide a great deal of skim milk, for the raising of better calves, which means richer fields and more prosperity all around.

I have a great deal of faith in the capabilities of winter dairying in creameries to furnish means wherewith to banish almost every economical evil of which the farmers complain. I have no faith in this practice, or any other practice, to bring economic salvation, except by the action of the farmers themselves. I have no faith in their industry being propped up. I have faith in their building it up, together with the prosperity of this country, and thus working out their own betterment of circumstances.

Sometimes people say to me, "if everybody went into this industry of winter dairying, where would the profit come from"? Well a great many people, who do not want to do what is right, excuse themselves by thinking that they would strive to enter by "the straight gate" and walk in "the narrow way,"—but they are afraid of making a crowd and keeping somebody out. You will never find any way to real success but the narrow way. The best way is always the narrow way, I do not care what line you are trying to follow up; and because it is narrow, it will never be crowded,—not because of the lack of room at the gate to get in, but because of lack of heart and courage, and continuity of purpose and effort. Then, in the economical production of butter, it will always be advantageous to produce only the best.

I have spoken quite long enough on the economical production of butter from the farmer's standpoint, without saying a single word about the manufacturing process. However I will say a few words about that now. It is never economical to produce poor butter. A pound of butter which will not fetch more than 11 cents, has cost somebody just as much as a pound of butter which will sell for 25 cents. It is always economical to help the cow to produce a large quantity of butter-fat in her milk, because five-sixths of the butter is fat, and one-sixth water and curd. Now you will not forget that the elaboration of milk by the cow is a most mysterious and exhausting process. It means exhaustion of the nervous force. If you have a cow that is abused, kept out in the cold, ill-fed and uncomfortable, she will give you less butter-fat invariably than one that gets better attention. In butter-making it pays always to be a gentleman. Our folk in Canada are getting to "size a man up" by the clothes he wears. That is a poor plan to discover a man's gentleness or greatness. I believe in the meaning of the word in dairying and elsewhere—a man who is gentle and tender and strong. Now, if you will be harsh and cruel with the cows, you are no gentleman; and you will get only a rough man's pay from them.

Then, after the milk is made by the cow it is always economical to have the best process provided to get the butter-fat out of the milk. After the milk is set, if left at rest, its globules of fat which are held in suspension, easily rise to the top. Stillness and coolness are two conditions required.

Because many of the patrons of cheese factories use the cheese factory cans for setting milk in, after the factory closes, so as to get a large share of the cream for

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butter-making, I have had some tests made to discover their suitability for that purpose. I have found the loss from deep setting in common factory milk cans to be six per cent greater than when the milk was set in ordinary shot-gun cans.

Then I set the milk at temperatures from 98 degrees down to 78 degrees, putting the cans in ice water, and found no appreciable difference when milk was set immediately after milking.

I have set the milk immediately after milking, and one hour later, and have not been able to avoid losing 1i per cent additional of the butter-fat, by the delay of one hour in setting. The slowness of a man is contagious—it affects the fat globules in his milk.

Then we have set the milk for periods of 11 and 22 hours respectively; and in the 11 hours' setting there was an additional loss of eight per cent by the shorter period of setting.

We have added water at different temperatures, from 160 degrees down to 60 degrees. I found no appreciable difference from putting water in the milk in deep setting pails.

Then in setting tests with cows at different periods of lactation, averaging 9, 6 and 2 months, we found by the use of the deep setting pails, we recovered only about two-thirds of the butter-fat from the milk of cows which had been milking from five to twelve months. For four days we set the milk pails in water at 38 degrees with the milk when set at a temperature of 78 degrees; and the loss from milk of cows that had calved nine months was 28 per cent; and from that of cows that had calved six months, 21 per cent; and from those which had calved two months, 13 per cent of the butter-fat unrecovered.

For four days the milk was re-heated to 98 degrees and set in water at 38 degrees; the loss from the milk of cows which had calved nine months being 34 per cent; from the milk of those which had calved six months 24 per cent; and and from that of cows which had calved two months 12 per cent of unrecovered butter-fat.

In shallow pans we obtained better results from the milk of cows calved more than six months, than by any other method of setting.

Many farmers say that by the whirling process of a centrifugal machine you cannot get all the butter out. If a cow has calved more than six months, by the use of the centrifugal cream separator you will get over 20 per cent more butter from the milk than by the ordinary deep setting method. If she had not calved over two or three months, you will get about 10 or 12 per cent more butter.

Then, we have been trying the effect of heating milk, to remove that offensive odour, which is caused by the feeding of turnips. When we heated the new milk to 150 degrees, we have not been able to quite eliminate the odour.

Then we have heated the cream from other milk to 150 degrees. A few years ago it was thought, that if you heated the cream above 90 degrees, you would burst the globules of fat, and spoil the butter. That is not the case, and by heating the sweet cream to 150 degrees, we have quite eliminated all the odour of turnips. The butter seems to keep better, and we got one pound of butter from one pound less of milk, than we got by not heating the cream.

A common complaint that comes to us by mail, is that "the butter won't come." Well, the butter will come, if the cream be churned at a proper temperature. I have put the limit of time for churning at 35 to 40 minutes. I heat the cream just high enough to make the butter come after about 35 minutes of agitation.

I find some people complain that there are specks in the butter. If you allow the vessel containing the cream, to be exposed to the action of the atmosphere, a part of its moisture will evaporate, and a scum or skin will be formed on the top of the cream. That will be broken up by the churning, and you will have merely small portions of thickened, dried cream in your butter. Prevention is better than an attempt at cure. Let the cream vessel be covered, or by frequent stirring prevent the formation of the skin of dried cream. The straining of the cream into the churn is also a good measure for keeping specks of thickened cream or curd from finding their way into the butter.

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Occasionally, butter-makers find the butter full of streaks. That condition may come from the retention of portions of the butter-milk in the mass of the butter. The addition of a quart of water for every two gallons of cream, after the granules of butter begin to appear, and before the churning is completed, will help to bring about a speedy and full separation of the butter-milk. When the butter-milk has been removed, the granular butter should be washed with cold water. In summer the temperature of the water should be about 55 degrees, and in winter about 60 degrees. For the washing, the churn should be revolved a half faster than for the churning. Care should be taken to prevent the granular butter from settling on any sediment of curdy substance which may be left on the sides or bottom of the churn after the butter-washing water has been withdrawn.

A streaky condition of the butter, sometimes results from an imperfect mixture of the salt with the butter. Re-working, after the salt is dissolved, will correct that. Fine grained salt only should be used. The presence of salt should be perceptible to the taste, but not to the sense of touch.

It is economical to make only the best quality of butter, and that is why one of my assistants has been left in Manitoba this year to give illustrations in butter making. I hope the people will attend those meetings whenever possible in order to see how butter can be made economically to obtain the best quality with the least amount of work or waste. Far back in Manitoba where the men do all the butter making, one of my assistants wrote me last year that the butter was so bad that the shopkeeper could not sell it at all; he said he gave it to the Indians, and there have been strained relations between him and the Indians ever since. So it is economical to learn how to make good butter to get the highest price and to promote good feelings between those who make the butter and those who buy and eat it. I will not tell you now anything further about the process of making butter, but I will be very glad to send to the people of Manitoba and elsewhere in these north-western parts bulletins and reports giving full instructions and particulars on butter-making, so that they can always count on getting the largest quantity of the best butter from the milk they handle.

It is economical to have swine on the farms of Manitoba to consume some of the inferior and spoiled grain. Of course I know there is an objection to having pigs on the farms in Manitoba, but still I think the people miss a great chance for extending their business by not doing so. Portage la Prairie, Winnipeg and Brandon might be great centres for pork and beef packing, and this province instead of paying so much for canned meats and cured bacon brought from other places, could produce these goods and thus reduce the outlay. The poor despised hog has a poor chance to do for his owner all he is capable and willing to do. Here, in Manitoba, the people seem to have regarded the hog as the cause of the prodigal son's aberrations. But I will venture a suggestion: that very good-hearted, but very uneconomical boy, kept on getting down from bad to worse financially until he commenced to feed hogs, and then his salvation began. You can draw any inference you like for Manitobans.

It is economical for a man to wisely administer his money. I know of men whose main ambition in life is to get a bare living, two ounces of tobacco and four cigars a week. I want to tell you that it is not economical to spend money on tobacco. When a man smokes he does so much less thinking about his business. I will not say that a man that does not smoke is a better thinker than the man who does smoke, but a man who does smoke in a climate like ours, does not do so much thinking as he would do if he did not smoke; and therefore our young men are getting into the lamentable habit of soothing themselves into the pleasant condition of not wanting to think.

It is a good thing for a man to buy books and papers for himself and family with the money he has to spare for luxuries. The farm, the farm life, the farm receipts, the farm home will all respond to such investments. It is a pity that so much of the trifles that are available and adequate for the elevation of the family should end only in a smoke.

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It is wise for a man to administer his manhood on the farm and off the farm so that he will be the best man he can be, and then he will be the best farmer he can be. By doing that you will find that economic farming will result in making this one of the pleasantest and best places in Canada in which a man may follow farming for a living and for everything the heart of man can honourably and honestly seek.

## (2.) Address to the Central Farmers' Institute of Ontario.

*(Delivered at Toronto, Ont., February, 1893.)*

Mr. President and Gentlemen,—I am glad that my other engagements and duties permit me to attend this yearly gathering of the representatives of the Farmers' Institutes of Ontario. Most of us who come here have more expectation of being helped in our own calling and business than of giving what may become helpful to those whom we meet. However, in this as in other matters, the action and reaction are inseparable, and probably those who give the most help to the members of the Central Farmers' Institute will derive most benefit from its sessions.

### BENEFITS OF FARMERS' INSTITUTES.

The ordinary labour of the farmer is apt to be of a monotonous and dreary character. Frequent gatherings such as this, help to lift up our occupation into more pleasant experiences as well as more profitable practices. Capacity for good management comes through knowledge, and ability to cope with difficulties is strengthened by conventions like the present. This meeting will fail to fulfil its best functions, if it shall result only in the presentation and dissemination of information—no matter how good or apt that may be. To my mind, its best quality of usefulness lies in the opportunity and power which it possesses of affecting the courage, the attitude, and the spirit of the common people of Ontario. In rural communities good times put people in good spirits. I put the converse to you to-day and say that good spirits will almost, if not altogether, bring good times.

Let me mention, in passing, how pleased I am to recognize the vitality and growth of thisi nstitute. It is commonly spoken of as "The Farmers' Organization of Ontario." It is to the credit of its officers and executive committee that the organization is alive and is continually adapting itself to the new needs of those whom it is designed to serve. Organization really implies the happy and best adjustment of certain means to attain a desired end. If all the organs in any organization do not work harmoniously, the sum total of achievement will be very much lessened. The apathy of some of the more distant organs of this institute (I refer to some local institutes in some Sleepy Hollows in the province) may cause such a condition of sluggishness in the spirit of the farmers in their district, that the most that can be said in their praise will be that they have attained unto a deathlike respectability.

The good clear thought of this central institute should be sent throbbing throughout every part of the agricultural community to the utmost ends of Ontario. On the other hand, the delegates from the several institutes should bring to this central gathering every year contributions of curiosity (and that is a quality in which our farmers are all too deficient), information, enthusiasm and hopefulness. By doing this for the central institute every farmer will give something to all the others without making himself any the poorer thereby. At the same time he will acquire from contact with the others, a large measure of these qualities of spirit and heart in his work which can be concreted in his own practice and realized upon in dollars and cents during the following years.

I do not desire to leave an impression upon your minds that the most possible outcome of this institute can be stated in dollars and cents, or can be wholly concerned with the getting of them; but the little part I propose to take in its proceedings will have in view as the primary object the helping of you to realize more money from farming.

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## AN AGRICULTURAL REVIVAL.

An agricultural revival would not be a bad feature of our progress in the present day. I mean a real old-fashioned revival, such as when people met often in a spirit of most earnest and serious concern to discuss problems which were thrusting themselves upon their attention with irresistible intensity. To be a preacher in that revival, with the gift of stirring men's hearts in order to move them to right action, would indeed be a splendid opportunity for helping to call out the good and the God that is in all men. I use that phrase in a spirit of utmost reverence, because in all the manifestations of the God-head in nature, we see a constant endeavour to put and keep all things in their correct relationship with each other. When a farmer acts in that same way he is manifesting and justifying the possession of his noblest birthright as a man. The application of this principle is not limited to putting soil and seed in their proper relationships to each other through the best methods of cultivation; to putting animals and food in the correct relationship to each other as to quantity, quality and quarters; it should extend also to adjusting the relationship of the finished products which the farmer has to dispose of to the needs and demands of the markets which he can reach. It also implies the correct adjustment of himself to his business as a master and manager and not as a disheartened imitator.

When threatened with hard times, and much more so when they are at the door, it becomes men to be economical. By economy I have no reference to what is generally called "stinginess" or "meanness." The two are as wide apart as the poles. Economy is simply the wise administration of all the agencies and agents which a man can control. It implies the taking into his service of new agents if new work must be undertaken for which the old agents are inadequate. It implies the frequent examination of surrounding conditions, in order that the right agents and the best agencies may be selected. The conditions which surround farmers in Ontario have become greatly changed within the last few years. It is commonly reported that these changes have been for the worse and not for the better, and in this, as in many other cases, frequent repetitions of half-truths sometimes give them, to the minds of the credulous hearers, all the validity of sound reality. These changes of conditions have not come by the will or doings of a few people. They are the outcome and achievement of all those forces which have been at work in the progress and consolidation of our English speaking civilization. Among these I might mention railways, telegraphs, telephones, newspapers, schoolhouses, etc. They have brought markets so close together that direct competition now exists between all the producers of any one class of products in all parts of the civilized world.

The general diffusion of knowledge, and the new wants which that knowledge has brought in its train, require food-products different from those which were formerly the staple diet of the people. World-wide competition and a demand for a better class of food on the part of all people should be reckoned as new conditions which the farmer must meet by an agriculture suited to them. It will no longer pay to keep selling the crude, bulky and primitive products of agriculture which average only meagre returns in money, and which tend to deplete the soil of the substances which are required to enable it to carry to profitable crops. The production of the food products of concentrated quality and value, such as butter, cheese, pork, beef, mutton, poultry and fruits, affords scope for the exercise of intelligent labour, with profit, and at the same time protects the land against exhaustion. It is a fortunate encouragement to those who are extending their operations in dairying, that the prices for dairy products have been maintained at fairly satisfactory figures during the year. The demand in Great Britain for Canadian cheese has been active and more favourably preferential towards Canadian products than ever. The notable increases in the value of the shipments of cheese and butter (under which the prices and the demand have been sustained) indicate a trade which may be much further enlarged with advantage.

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## CANADIAN FARM PRODUCTS IN THE BRITISH MARKETS.

A brief statement of some of the matters which came under my observation during my recent trip to Great Britain may have value in this connection towards helping the farmers to adapt their farm practices to the requirements of that market for food products.

I went over to investigate the newer preferences of the markets for butter and cheese; and do these I added beef, bacon, poultry and eggs. As producers we must strive to meet the exact requirements of the consumers who are able and willing to pay the highest prices for our goods. We have no time to educate the tastes of the British public up to liking and buying the things which in our judgment they ought to prefer. Unless one happens to have a century or two of leisure it would not be worth while attempting the task of educating the tastes of the great consuming public. It is more expedient and profitable to cater for those tastes as they at present exist. The working classes in Great Britain, who are the large consumers of our Canadian food products, are both able and willing to pay for the exquisites and the delicacies in the foods which they buy. A while ago they had to content themselves with foods which sufficed only for the bare sustenance of life. Now they are fastidious in regard to both flavour and appearance in the foods which they select. They are also very conservative in regard to names, and have a strong British sentiment which leads them to pay 20, 25 and 50 per cent more for the very same goods under the name of "Best English," than they are willing to pay, or are required to pay under the name of "Best Canadian." I could find but very few butcher shops where Canadian beef under its own name could be purchased. As one butcher said to me, "We keep only the 'Best English;' Canadian and American beef can be found only in the rough shops where the cuts are cheap." I learned of one instance where a retail butcher was reported to have made a profit of a million dollars in five years from selling prime Canadian and American beef as the "Best English." Of course his customers were not wronged, because they got as good value in every pound which they purchased as could be got in a pound of beef, but a very flagrant and very great injustice was inflicted upon the English and Canadian farmers.

In very many cases the crafty shopkeeper gets far too large a share of the price which the ultimate consumer pays for our own food products. We must devise a way of getting some of our Canadian products more directly before the consumers under their own name. I know what can be said in the matter of the enterprise of commerce, and the rest of it, being equal to the needs of economical distribution. But just here comes in the call for the exercise of that quality of which I have spoken—that of putting things in their correct relationship to each other. Here it is the putting of the Canadian producers right in their relationship to the ultimate consumers without the intervention of somebody who by some means gets more than a fair share of the consumers' money for the service which he renders.

When I spoke before this Institute last year I had occasion to remark that a considerable portion of Canadian cheese was ultimately sold under the name of "Best English." I have to repeat at this Institute what I said then, with the added emphasis that a larger proportion of our cheese and other products than I then thought were sold as "Best English," are now being disposed of in that very way.

I think we will be able to use the mammoth cheese which we made at Perth, in Lanark County, to overcome part of the disadvantage under which we now lie. As some of you know, the mammoth cheese was made at one of our Experimental Dairy Stations for the purpose of forming the centre of our pyramid of Canadian dairy products at the World's Columbian Exposition at Chicago. I have arranged for it afterwards to go to England, where it will be taken in hand by Mr. Thomas J. Lipton, the greatest of all retail provision merchants in the world. He has ever so many shops in London alone, some 200 altogether in Great Britain, and sells over 225 tons of tea per week. He will exhibit our mammoth Canadian cheese in every large city of commercial importance in Great Britain and Ireland. This will bring

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to the mind and attention of the public something new in reference to Canadian cheese, which may lead them to inquire from their grocer or provision merchant for a supply of it under its own name.

Others more competent than myself will doubtless treat of and deal with the question of the scheduling of our cattle by both Great Britain and the United States. It is useless to belittle the injurious aspect of this to the Canadian cattle trade. It is more foolish to magnify the effect into the form of a national calamity. Everybody knows that our cattle in Canada enjoy the most superb health. The dreaded disease of pleuro-pneumonia has not been and is not now to be found anywhere within our borders. In the meantime we must put up with the temporary loss, which comes from the misunderstanding and consequent unfair regulations of the authorities in these two countries. At the same time this may be looked upon as an ill that is not all ill in its effects, if it induces the Canadian farmers to turn their attention towards feeding the cattle to a finish of fatness before they are sold or shipped from our own country. The compulsory aspect of this is the most distasteful to a high minded and independent people like our farmers. However, if it have the result to which I have just alluded, while it is an injury and an ill, it will not be without a measure of benefit in its train.

### MORE ECONOMICAL FEEDING OF LIVE STOCK.

There are some matters in the home practice of the farmers which need more serious attention than the restrictions which these two governments have seen fit to impose upon our cattle. Let me ask the attention of the farmers of Ontario to the bulletin which I had the honour to issue on the feeding of steers last November. I shall be glad to mail a copy to every applicant who sends his name and address to the Central Experimental Farm, Ottawa. Farmers of Ontario should study economical methods of feeding in order that they may produce cattle at the least possible cost, because wasteful feeding will so increase the cost of production that no market within reach, under the most favourable circumstances, can leave a profit to the feeder. In conjunction with well-cured corn ensilage, 5 lbs. per head per day of meal seems the maximum limit for the economical fattening of steers; and very little above that seems the maximum limit of meal per day for the economical feeding of milch cows. We carried on a very comprehensive test during the last two years at the Central Experimental Farm to discover if there were any constant relation between the quality of the food which was given (in its content of meal or grain), and the quality of the milk which was yielded, in its richness or percentage of solids. We found that the addition of meal to the ration of cows after it reached from 5 to 7 lbs. per head per day was not economical in point of either the quality or the quantity of the milk which they gave in return. We made something like 20,000 separate tests of the milk in order to have such a measure of data as would enable us as to draw conclusions which would certainly not be erroneous or misleading.

From 5 to 7 lbs. of meal per day seems a small allowance for a milking cow or a fattening steer, but if that amount can be saved to the farmers it would mean many millions of money per year to the cattlemen of Canada.

### THE ROBERTSON MIXTURE FOR ENSILAGE.

For some years I have been seeking to discover some substitute for the expensive and rich meals which have been fed with corn ensilage in order to make it a complete ration for fattening steers or feeding milking cows. At last I venture to think that I have been successful in discovering a substitute which is within easy reach of every farmer in Ontario, and almost every farmer in the Dominion who keeps cattle. I have here samples of ensilage made from Indian corn and horse-beans which have been grown together in the same rows as sunflowers. The sun flowers and horse-beans supply the albuminoids and fat in which the corn is deficient.

The method of growing is as follows: $\frac{1}{2}$ bushel of horse-beans are mixed with $\frac{1}{8}$ bushel of Indian corn; these are sown or planted in rows 3 or $3\frac{1}{2}$ feet apart on one acre. When the crop is grown the product from two acres of that mixture is put

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with the heads from ½ acre of sunflowers (the Mammoth Russian sort). The albuminoids from the beans and sunflowers, thus provided in the ensilage, will be equal to 4½ lbs. of mixed cereals added to every feed of 50 lbs. of ordinary corn ensilage. Besides, the albuminoids in the green and succulent state of these plants are likely to be more digestible than in the ripened grains.

The value of this to the farmers and cattle-keepers in Ontario is not quite evident at first sight. The advantages are as great as though a farmer could get nearly 40 bushels of mixed cereals per acre, in addition to his Indian corn crop, wiihout the expenditure of any more labour or money than in the growing of the corn alone. The extra cost of growing ½ an acre of sunflowers, and providing the seed for the horse-beans grown on the two acres in the rows with the corn, is equal to $15. Against that extra outlay the farmer gets from the 2½ acres enough additional feed to be equal to 115 bushels of mixed wheat, barley and oats. That is equal to a clear gain in cash (valuing the mixed grain at one cent per pound) of almost $14 per acre more than from the growing of Indian corn alone, and the growing of ripened grains to feed with it in order to make it a complete or well-balanced ration.

If a patron of a cheese factory or creamery in Ontario would grow three acres of this "Robertson Mixture" for the feeding of cattle, it would be equal to a saving or gain to him, (as good as cash in the first year) of $41. Multiply that by the 50,000 patrons of cheese factories and creameries in Ontario, and you have a sum of $2,050,000.

That is not the only gain which would come to the hard working farmers of Ontario from this new discovery. There would be a clear gain to the fertility of the soil equal to about 30 pounds of nitrogen per acre. When it is remembered that a ton of wheat takes from the soil annually about 40 lbs. of nitrogen per acre, it will be apparent that the more the farmers grow beans with their corn and feed this combination, the better will they be able to grow all other grains without permanent exhaustion of the soil. I do not desire to press this aspect of the question very far at present, but this may be said by way of increasing your interest in this new crop for feeding. In all those commercial fertilizers of which nitrogen is a constituent part, the nitrogen is valued at at least 15 cents per pound. The clear gain in the nitrogen from the growth of the bean crop may be quite equal to $4.50 per acre. If this sum be multiplied by three acres for every patron of all the cheese factories and creameries in Ontario, and that be added to the direct cash gain from the growth and feeding of this crop, the sum will come to $2,725,000 per annum or more than $50 per patron annually.

The farmers of Ontario well know that no one who has been honoured as their teacher in matters pertaining to their own practice is less visionary or more cautious in making statements for their guidance than myself; and I ask them to accept the information upon the new mixture for ensilage, which I am able to offer them, with the assurance that it will more than justify all that I have predicted or claimed for it. In order that it may become speedily, widely, and correctly known to the farmers of the province I want the names of 100 reliable and careful farmers who have silos, and who will grow a crop of this "Robertson Mixture for Ensilage" during the coming year, under directions which I am willing to supply. The seed will be furnished at cost price; and of course there is no such thing a personal proprietary right in the mixture. It is given to the farmers free, with the very best of good wishes that it may do for them more than I have ventured to state.

### THE FATTENING OF SWINE.

On this subject I shall detain the institute but a moment. Canadian fed and Canadian cured swine products are in very active and favourable demand in Great Britain. It will pay our farmers to rear and fatten more of this class of stock. According to the breed of the animals and the care which they receive, from 4 to 5 lbs. of the coarse grains will yield 1 lb. of increase in the live weight of the swine. Canadian bacon and hams are almost equal in reputation to the Danish and Irish

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products. In view of the increased demand for live hogs in Canada, I hope our farmers will give this branch of their business a wide and rapid extension. As a rule it will pay them much better to sell their hogs alive than to butcher them at home and to sell them dressed. When sold alive they can reach the packing-houses in such a condition as to be capable of being dressed, cured and sent to England in a uniform and satisfactory condition. Great Britain imports about $20,000,000 worth of swine products annually. A much larger share of them should hereafter go from Canada.

### POULTRY AND EGGS.

In the matter of poultry and eggs Canadian farmers need as much awakening as they do in the matter of cows, butter, cheese and beef. Great Britain imports of these two articles of food to the value of $20,000,000 a year. I know there are difficulties in the way of reaching England with perishable products such as these, but they are not insuperable. I have information with regard to the egg trade which I think will be helpful in promoting it during the year, but I will not detain the institute at present. Let me cite one instance of the capabilities of the trade in poultry. When in Liverpool in company with Mr. John Dyke, I examined a shipment of Canadian turkeys which had just arrived. There was a very active demand for them at 9 pence or 18 cents per pound. The birds arrived in splendid condition with the feathers on, and it was mentioned to me (and I hope it was true) that the shippers would net about $3,000 of profit on the venture. Between 18 cents per pound and the price which the Canadian farmer has been getting for his turkeys, there is sufficient margin to leave a good profit for somebody; and if the farmers would give their attention to this branch of their business, they would get a very much larger share of the ultimate price than 10 or 12 cents per pound here. If some one could wave the magician's wand over the country, and multiply its wealth, I think he would do it through the cows and hens which have been thought the least valuable of our wealth creating agencies. If this meeting should result in the farmers giving clear thinking and energetic acting to these two branches of their business, it would result in the real acquisition of the wealth which the dreamer might suppose a magician only could create.

### BUTTER-MAKING.

As the subject of winter dairying is on the programme for discussion, I need not make but casual reference to it here.

The four winter butter-making stations in Ontario, which are being managed by the Dominion Dairy Commissioner this year, are being most heartily supported by the farmers in their vicinity. The supply of milk at them has been quite three times as much as that of last year; besides over a dozen of winter butter-making stations were started in different parts of the province, as a direct outcome of the successful illustration of this business which was given by the Government last year.

The English butter merchant judges our butter as public men often estimate each other. He tastes the top and tastes at the sides of the package when *he buys* the butter; that is, he judges it at its very worst points. When he offers *to sell* the butter, he bores down the centre of the package and shows it at its very best, to his expected customer. In order that the butter may be at its very best in all parts of the package, creamery men should use the best quality of grease-proof paper on the inside of the package. There is a very favourable attitude in the English markets towards our winter-made butter. The dealers and consumers do not suspect us of any counterfeits or imitations. In that regard—as it should in all others—the name of "Canadian" stands for honesty and excellence. Of course a good many people who are faithless and unbelieving are continually saying,—"But if everybody goes into the business will it not soon play out?" Such logic is like that of a man who might say, "Straight is the gate and narrow is the way, and don't you think if I tried to get in I might crowd everybody else out?" In all these matters it takes intelli-



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gence and care to get money out of any branch of farming, but with those who exercise these and follow farming as a business, there is as much profit-making as in any other honourable calling.

I am glad to have had an opportunity of offering these few observations to this representative gathering of farmers, because I believe some of the information and thoughts will help on the emancipation of the men and women of Ontario into happier lives. The immediate good will not be the only good which will result from the putting of these new and better plans into practice. The further and better result will be the lifting up the farmer's life to a higher plane of activity, wherein he will find scope for the exercise of every manly faculty and power. The first gain to be realized may be the amelioration of his hardships in making money. The best and ultimate gain will be the lifting of his life intellectually, morally and spiritually through doing right, and putting things around him in their correct relationship to each other.

## (3.) On the Production of Milk.

*(Report of an Address delivered before the Convention of the Ensilage and Economic Cattle Feeding Association of Central Canada at Montreal, February,* 1893.)

Mr. President and Gentlemen:—

You must not expect a formal speech. I am to open a discussion upon the production of milk, and I shall only try to sprinkle a few thoughts over the audience that you may discuss them and fertilize them into fruitfulness.

Milk is a complete food; therefore the people of our cities and towns are drinking more of it. Common sense is becoming more prevalent where people are civilized and in consequence they are drinking more milk. How to get it of the best quality at the lowest cost, is a very important subject to the producers and consumers.

From his standpoint, the farmer should consider how he can produce milk of such purity, of such flavour, such colour and keeping qualities as will please his customers, without costing too much. It is comparatively easy to tell how the best quality of any product can be made; it is not so easy to make it without costing more than you can get for it. We need a discussion on the question of how to get the best quality of milk at the least possible cost.

There is one way of getting it, by feeding the cow on a cheap food that will make her give the best quality of milk, and the largest quantity at that which she can give.

From the consumer's point of view, milk must first of all be pure. The permanent vigour and health of our people depend on the supply of pure, wholesome milk for the children. This is an important and far-reaching question which touches the vitality of the people. It should not only be pure with regard to its wholesomeness, but clean in its condition. Milk is more often rendered impure by being left exposed in a foul atmosphere than from the cow eating anything that is offensive. The cow is a wonderful organization, and will generally prevent any thing impure that she may eat from damaging her milk. Milk is seldom unwholesome from what the cow eats; but it may be dangerous from what she drinks. Above all things in the dairies and milk houses, let the atmosphere be as pure as possible, free from bad odours and taints. The cows must have an abundant supply of pure water. It is desirable that the milk should be of a most pleasant flavour. I need only give you one illustration: Few people like the flavour of turnips in milk; nobody likes a sour flavour in milk although that may come from ensilage. If the milk be left exposed to the smell of ensilage, you will get the flavour and odour of vinegar. It should be protected by removing it from exposure to that. I will make only this further observation on that point, if milk be suspected of being unwholesome or impure in the least degree, let it be heated to 160° or 170° before it is consumed.

It would pay the farmer to bear in mind two matters in feeding milking cows; first of all, to give them the juiciest kind of feed he can provide. Let him take June grass as his model feed; it is succulent, and nice flavoured. The question is how to

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get feed for the stable and winter as near as possible equal to what the cow gets in the pastures in June. There are two ways. It can be obtained by saving grass (in the form of hay) and preparing it in such a way that it can be given to the cow succulent and juicy. You cannot bring the original juiciness of the grass back to hay by a simple soakage, but you can help it a good deal in that way. If hay be fed with roots and the whole mass be left mixed for twenty-four hours before it is fed, you will get about twenty per cent more milk out of your hay; it will be brought back as near as possible to its natural state. Another way is by providing ensilage, but as I am going to speak on that subject to-morrow, I barely mention it now.

The common grasses in this country are a complete food for cows. Indian corn is not a complete food. It is a grass, but the constituents of corn are not so proportioned as to support life, like the constituents of June grass or Timothy. I do not recommend Indian corn fodder as being the best grass, unless something else, which contains the constituents which the corn lacks, is put with it.

The point needing attention in the food for cows, is to have it palatable and even stimulating in its flavour. I do not know that all stimulants are bad for either man or beast. We have a new kind of ensilage at the Experimental Farm from the heads of sunflowers with Indian corn. The stimulant in ensilage from the oil of sun-flowers makes the cattle greedily fond of it. Any kind of hay well cured and well preserved will have this property; but if it be left loose and exposed for a day or two, or if it be taken off the mow and tossed and trampled under foot for twenty-four hours the appetising, stimulating fragrance and flavour will have gone and the cattle will not like it.

Some people suppose that the giving of salt to cows is a trick of the trade to make them drink more. If a cow can be fed in any way so that she will give the largest possible flow of milk and still be in good health, that milk will be the best of milk from that particular cow. The more work you make a man do, if he keep well, the better work will he do. Let a man work at half speed and capacity and the work will not be half so well done as if he were working hard but not overworked. Let the cow give the largest flow of milk possible, and the quality of the milk will be good for that cow.

The animals should be kept comfortable. If cows have lice on them you cannot get more than seventy-five per cent of the amount of milk you can get from cows thoroughly clean. A treatment of kerosene emulsion (coal oil and soap) rubbed in will kill the vermin. If the cattle be not turned out so that they can lick themselves, they will be uncomfortable unless they are brushed occasionally. Another point I might throw out for your consideration is, that it is profitable to select cows from those we have, so that a less number of animals will give more milk on less feed. Some cows do not deserve stable room.

I know of no infallible method of judging the merits of a cow except by weighing her milk and watching how she is fed. It will pay to keep cows milking as long as ten months a year. That prolonged season has a decided influence on the milking of the cows the following year. We have been urging farmers in Ontario to produce milk in winter as well as in summer. Let me instance the case of the president of one of the cheese factories where butter has been made during two winters. Mr. L. A. Price had some thirty cows a year ago last summer; he did not keep them milking the previous winter, but he did during the winter of 1891-92, partly to encourage his neighbours to support the winter creamery. He bought extra feed to go with fodder corn; the result was that the skim-milk paid for the extra feed; and he had all the butter money as clear gain above the income of former years. He told me, when the milk went to the cheese factory the following May, that he had twenty-five per cent more milk from the same cows than the year before. The fact of their giving milk all winter caused an increase of twenty-five per cent in their milk the following year.

It will pay farmers to make the most of the by-products of milk; what is done with them is intimately connected with the profits of the man who makes the milk. Small pigs can be reared on skim-milk and butter-milk and there may be swine products to sell with the direct products of the cows.



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Mr. Price has not a large farm, he keeps his cows fairly well, and sells on an average (hogs were dear last year), but in an average year, he sells about seven hundred dollars worth of hogs,—not thoroughbreds, but swine for slaughter. Because he feeds the by-products of the milk to the pigs and gets them well started, he gets a direct income from his cows equal to fifty dollars a head and a revenue from his swine of some seven hundred dollars a year. There is money in it.

I conclude by these suggestions: Get the milk pure and wholesome, because on this depends the increasing demand and the health of the people; give the cows a chance to make it like that by feeding them good succulent feed, in warm stables, with all the salt and water they want; see that the milk is handled afterwards so that no impurity comes to it, and you will find the production of milk to be one of the most profitable branches of farming. Progressing from that you can sell milk, butter, cheese, bacon and beef. That is the kind of agriculture which pays best in Canada.

MR. BROWN:—Has milk a different taste when fed on corn ensilage rather than when on roots and meal?

PROF. ROBERTSON:—Not less palatable and not less wholesome.

MR. BROWN:—When fed on corn ensilage is it as rich?

MR. GRINDLEY:—Can you increase the quality of milk by feeding?

PROF. ROBERTSON:—The question resolves itself into two parts; first the quality of the milk in its flavour and appearance, and second, the quality as to its composition. The taste, the smell and the appearance of the milk can be modified by the quality of the feed and the flavour of the feed. Turnips will impart a turnip flavour from the essential oils; corn meal contains oil, oatmeal has oil, wheat has oil, and every cereal has oil. I do not remember the percentages, some have a large percentage and others small, but the oils are there. You may affect the colour of the milk by the nature of the food, but you sometimes have very poor looking milk which will show by analysis that it is a good deal richer than some yellow milk. The appearance of the milk is no indication of its richness; I mean the yellowness or the whiteness of the milk is no indication of its richness. The yellowest milk I have been offered for a long time I got in a fashionable hotel in Montreal; evidently it was made of skim-milk, corn starch and dye.

If the cow is getting a food which is insufficient for nourishing her body, her body will find for itself first, and use the surplus for the production of milk. The cow is not constituted so that she can transfer wholly to another what she needs for herself, although even cow motherhood can go a long way in that direction.

Corn ensilage and hay are both an incomplete ration for milking cows. They will live on it, but will not be thoroughly nourished in all parts, and the milk from such food is not milk of normal strength. If you add wheat bran or cotton seed meal or oil cake to the corn ensilage you can get as perfect and well flavoured milk as any person can desire. The improvement is not by leaving the ensilage out but adding something to it to make it a complete ration.

The effect of the feed of the cow on the composition of the milk is not so direct as though the cow were merely some mechanical device or chemical contrivance. The cow is a living organisation, and the organs of a cow will work in a definite way from force of habit. The composition of the milk will not be altered, unless the working of the milk-secreting organs be changed or affected.

If the feeding of ensilage made bad milk, the milk from three thousand silos in the country would be bad. The fact that unsatisfactory milk from ensilage-fed cows is the exception, proves that the ensilage is not the cause. If you change the food of a cow quickly, you interfere with the action of the organs that make the milk; but it does not necessarily follow that by changing the composition of the cow's feed, you make the milk richer or poorer. We have cows which by actual test have given milk testing three per cent of fat at one time, and within twenty-four hours have given milk testing four and three quarters per cent of fat. By some means the action of the organs which make the milk has been affected. I will give an illustration of that: We put twenty-five cows into three rows as nearly equal as possible as to breed, time of calving and weight. All got the same bulky-fodder rations. We

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gave the cows of one row four pounds of mixed meal per head, per day. The cows in the next row got the same bulky-fodder ration and seven pounds of meal per head per day. If the richer feed made a permanent difference in the quality of the milk, the milk from these latter cows should be richer. The third group of cows received the same bulky-fodder ration and four pounds of meal per head, per day, for a fortnight, five pounds of meal per day for the next fortnight, six the next, seven the next, eight the next, nine the next, ten the next, eleven the next, and twelve the next—or an increase of one pound of meal per head per day, every two weeks. In this latter case you would expect the milk to be richer because the quality of the feed was progressively richer. As a matter of fact, if we judge by one week's test, the milk may be richer from the increase of meal, but taking the results for five months, the milk of these cows which received the progressively richer ration was not richer than the milk of the other cows. It increased in quantity, but the composition had not been changed appreciably in five months by the richer feed. We took up the test the next year, and after making some twenty thousand tests of milk, I came to this conclusion, that the composition of the feed as to richness in meal does not alter the percentage of the constituents of the milk. If a cow does not receive enough feed to keep her in good health, she will drop off in the yield of milk; but the quality of the milk depends upon the nature of the animal and the quantity of milk upon how she is fed. To get the largest supply of milk at the lowest cost to himself, a farmer cannot afford to feed more than six or seven pounds of meal per head, per day with a bulky-fodder ration.

MR. MACPHERSON:—Is it not a fact there is another profit which you did not mention, and it is an important one, that is the fertilizer the animal made during that time?

PROF. ROBERTSON:—I would not like to say a single word that would prevent the farmer believing in the exceeding great value to him of buying feeding stuffs, if he can make a direct profit out of feeding them; but how much the manurial value is, I do not know. The manure is worth exactly what the man's skill can make out of it; one man makes nothing out of it, and another man makes a great deal.

MR. GRINDLEY:—You have decided the question pretty well as to what effect the food ration has on the richness of the milk. Is it not so that by the use of a stick or dog you affect the milk more as regards quantity than quality?

PROF. ROBERTSON:—As a matter of fact anything that makes the cow uncomfortable lessens the quantity of milk and the percentage of fat in it. I do not know how that is effected; but I suppose that nearly all the secretions of the body result largely from the action of nerves. Milk is a secretion by certain glands; and these are governed by nerves. Anything that disturbs the nerve centres keeps the cow from doing her work normally and properly.

A VOICE:—What do you think is the best method of producing the best and cheapest food ration for a cow supplying milk for the city?

PROF. ROBERTSON:—That depends on how a dairyman gets the feed, whether he buys it or grows it?

A VOICE:—I am speaking from a farmer's standpoint.

PROF. ROBERTSON:—About thirty pounds of the best corn ensilage, about five pounds of straw, five pounds of good hay, twenty pounds of good roots (mangels, carrots or beets) and five or six pounds of grain per day,—that would cost thirteen or fifteen cents per day, according to the size of the cow. That I find better than giving eight or ten pounds of grain per head, per day.

## (4.) THE FOOD-PRODUCING RESOURCES OF CANADA.

*(Report of an Address delivered before the Convention of the Ensilage and Economic Cattle-feeding Association of Central Canada at Montreal, February, 1893.)*

Mr. President, Ladies and Gentlemen:—When I come to address farmers, I seldom prepare beforehand the precise words in which to clothe my thoughts, and

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to-night instead of giving you a cut and dried lecture on "The Food-Producing Resources of Canada," I want to say something about how the food products from the farm of Canada can be increased in your own district.

In two respects Canada has a primacy of position among the nations,—in mineral resources and food-producing resources our country is not surpassed. I think Canadians know less of their own country than people who live elsewhere. Strangers who come amongst us recognize the great advantages we have in these regards more than our own people do.

It is the pleasure of many public speakers to dilate upon the vast resources of Canada, and it is my privilege to point out how they can be developed.

Upon the welfare of those who produce the food of Canadians and develop Canadian resources, depends the prosperity of the people as a whole. The growth of our cities and towns depends on, or arises from the need of handling the food products, distributing them, and manufacturing what the farming community wants. The growth of the cities and towns of Canada waits upon the intelligence and activity of those who produce the foods.

The food-producing resources of Canada are capable of rendering service and profit to every man who applies himself to their development, diligently and with skill.

The city of Montreal, the trading metropolis of Canada, owes nearly all its commercial importance to the fact that it handles the products of the farm; it ships out grain, cattle, butter and cheese, and these in turn pay for shipments of dry goods, groceries and hardware which come into Montreal to be spread through rural districts.

Look at the commodious warehouses and the splendid wharfs which, during the shipping season, are crowded with the food products of Canada in transit to Europe. Look at the fine shops and magnificent buildings; the large factories and the imposing railway stations, all of which have been called into existence for the purpose of facilitating the distribution of farm products and carrying the necessaries and luxuries of life back to the homes of those who till the fields.

I want you to see that if the quality and quantity of the food products can be increased, every man in business will have a chance to get a larger share of wealth for himself. If the farmer produces more wheat, butter, cheese and cattle, the men who handle these products have a better chance to increase the volume of their business and make more money.

In financial circles, in this money metropolis of Canada, there is a very clear conception of the value of remittances from the country. If the bankers in small towns report that the payments from their customers are slow, then the bankers in the large centres are very slow to let their capital out. Financial stringency follows close on the heels of slow remittances from the country, and slow remittances are consequent on scarcity of money to pay debts in rural localities.

If the farmer can pay off his obligations for groceries, machinery, etc., promptly, the country merchant is in a better business shape, and he in turn can pay his debts to the wholesale men. The importance of agriculture to the commercial enterprises of our country is easily seen by observing how sensitive they all are to the condition of the farmers, the food producers. When hard times prevail in rural districts, depression follows in every centre of manufacturing and commercial endeavour.

Why is it that bankers and other men are so anxious about the condition of the crops? It is because if hard times prevail in the country, hard times follow everywhere else.

Farmers create wealth. I want you to believe that. I do not want you to believe that they all acquire wealth. I will drop an illustration in passing. In this country of ours the farm products amount to about five hundred millions of dollars annually, and the total value of the manufactures of Canada is about four hundred and seventy-five millions of dollars. But there is a difference; wheat is an agricultural product; flour is a manufactured product, and you value flour at its full value and add it to the value of bread which is also a manufactured product. Thus the figures for manufactures include the cost of the raw material several times over;

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that makes a big difference between the sum total of manufactures and the value which has been added to them by labour, or the wealth which has been created in them. About two-thirds of the total value of agricultural products is a gain of real wealth created by the farmers out of the food-producing resources of the country.

As the farmers are able to exchange more of their products (which really are the embodiment of newly created wealth) the money, which facilitates the exchange of these things, will ebb and flow more regularly, and in so much larger volume, that it will float and bear all legitimate enterprises connected with the development of the country's resources to most successful issues.

The interests of the city and country, if not quite identical in our Dominion, should be always harmonious. It is the object of all farming to create wealth by the production of food and the raw material for clothing. With the single exception of fish the articles of food which sustain our lives wholly come from farms. In a study of the relation which the production of food sustains to the condition of human society which we call highly civilized life, it must be remembered that the farms furnish most of these things which outwardly distinguish and differentiate the civilized and cultured citizen from the rude barbarian.

As the farms of a country furnish supplies of food of superior quality in flavour and nutritive properties, so will the energy, ability and capacity of the people *to bring things to pass*, be improved. Good living is promoted by the farmers in this grosser sense, and from it comes also good living in most other senses. When an abundance of nourishing and palatable food, at a low cost of production, comes well within the reach of all the people, when a community is well fed, even to its poorest members, it is strong for the activities, claims and aspirations of our modern life.

No country in the world has more favourable conditions naturally in soil, sunshine, water and atmosphere for the production of fine food products than Canada, it also has vast areas of the best arable and pasture lands waiting to be awakened into fruitful service by the hands of skilled farmers. From the atmosphere and water come more than ninety-five per cent of the constituents of all our food products. Our climatic conditions are such as to permit the growing of such plants and crops as to enable our farmers to obtain these at the lowest possible cost to themselves.

One object of the Experimental Farm system of Canada is to furnish the farmers information how to make the most of these natural conditions. The range of the Experimental Farm work reaches from experiments in the cultivation of the soil to experiments in the handling of the finished products which are intended for the tables of our own people or for export to foreign markets. The whole of Europe is only about one-twelfth larger in area than the Dominion of Canada, which has a land surface twenty-nine times as large as that of the United Kingdom of Great Britain and Ireland. As yet, there are only some twenty-five millions of acres under cultivation, and of these, sixteen and one half millions of acres are under crop every year.

In the one article of wheat, which may be taken as typical of our ordinary cereal crops, Canada has a yield of almost five bushels per acre larger than that of the United States, although she still has a yield on the average of some fourteen bushels per acre less than Great Britain. The resources of Canada, and the natural adaptations of the country and climate, are not less well adapted for large crops than are most parts of Great Britain. When Canadian farmers enrich their fields with as much systematic skill and good management as do the English farmers, there is no reason why the average yield of wheat in this country, per acre, should not exceed in quantity, as it now excels in quality, that of any other place.

In the present and still more in the coming years, it will become less profitable to export the primitive, crude and bulky products of agriculture but the finished and concentrated food products from the farm can be obtained to the most economic advantage only by the growth of crops having a large yield per acre at the lowest possible price of labour.

The result of one series of experiments at the Central Experimental Farm Ottawa, to illustrate this has been as follows:—Experiments have been carried on

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to discover the relative results per acre by sowing the same variety of grain in the same soil, during the same season, at different rates. The results for the season of 1891, show the following facts:—Spring wheat sown April 21st, yielded at the rate of 47 bushels 50 lb. per acre, against 19 bushels, 10 lb. when sown on May 26th; oats yielded at the rate of 59 bushels, 24 lb., when sown April 21st, 84 bushels 4 lb. sown April 29th, and 40 bushels per acre, when sown May 26th; barley yielded at the rate of 65 bushels 10 lb. sown April 21st, and 37 bushels 14 lb., sown May 26th. In many other parts of farm work, improvements may be made in the production of cereals.

Experimental work in the feeding of cattle has also a very important bearing upon the prosperity of the country and the relative position of Canada as a producer of food for her own and other people.

At the present time, there are kept in Canada only some four full-grown cattle and four young cattle upon the average farm. By the growth of Indian corn fodder and the making of ensilage, every farm is capable of carrying on an average at least twice as many cattle, with increased profit to the farmers. Besides, farmers should be discouraged from marketing the primitive products, which, in the form of plants, take from the soil large stores of its fertility. They should be encouraged everywhere to sell animals and their products, which enable them to realize large incomes without the exhaustion of the soil.

At the present time at the Central Experimental Farm at Ottawa, experiments are being conducted in the feeding of steers on corn ensilage as the main part of the fodder ration. For the first two months they have been costing at the rate of less than nine cents per head, per day, and have gained nearly two pounds per day.

Great Britain imports cattle and beef annually to the value of some $65,000,000. Of that sum Canada has sent cattle to the value of $7,500,000. By the cheaper method of feeding cattle, it is possible for Canadian farmers to send to Great Britain in the not very distant future, at least one-half of the cattle or beef that she buys from outside countries.

Canadian farmers have exceptional advantages in providing cheap fodders for the production of beef. The new "Robertson Mixture for Ensilage" will be explained fully at the convention to-morrow.

In the growth of this excellent feed for cattle, Indian corn, horse beans, and sunflowers, Canada is better adapted than any other country, except a small portion of Central Europe, whose people will not be our keen competitors in the markets which we supply.

In the production of cheese, Canada has made great advance during recent years. The value of the exports for the year to June 30th, 1892, (wholly the product of Canada), was $11,611,399. The business is being rapidly extended in all the eastern provinces of Canada. Great Britain imports on an average $25,000,000 worth annually. "Bread and cheese" for a long time was a synonym for a perfect and complete food for the people. Canada can furnish both in increasingly large quantities. During the last financial year, Canada exported twice as much value in butter as during the year previous. Through the extension of the dairying movement in Canada, still larger quantities of this valuable food product can be provided and sent to Great Britain and other countries. No food product, of which the farmers can dispose, takes less from the soil and leaves them a larger amount of profit for their labours. In 1891, the Dominion Government established two winter dairying stations in Ontario, and during the past winter, six of these stations in Canada have been operated under the management of the Dairy Commissioner.

As a direct result of their influence, at not less than eighteen cheese factories in Ontario the managers commenced to manufacture butter during the winter. Thus the existing conveniences can be used to facilitate the increase in the food products of Canada, by the manufacturing of cheese during the summer and the manufacturing of butter during the winter.

Great Britain imports of butter annually to the amount of fifty-six millions of dollars. Of swine products the farms of Canada still furnish only a tithe of what they are capable of supplying.

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At the Experimental Farm at Ottawa, we have been carrying on experiments in the fattening of swine upon the coarse grains, and also upon frozen wheat. The results from the feeding of frozen wheat, have been very gratifying and promise to furnish exceptional help to those districts in Canada where wheat is in danger of being damaged from unfavourable weather.

Large numbers of swine have been fed exclusively upon frozen wheat, ground and soaked. The gain per bushel of wheat has varied a great deal, according to the kind of swine to which it was fed. The increase of live weight per bushel of wheat, has varied from nine pounds to over fifteen pounds per bushel of grain. The average, for over fifty swine, will show more than eleven pounds of increase in the live weight of swine per bushel of wheat fed. The quality of Canadian fed and Canadian cured bacon is being so highly appreciated in Great Britain, that it stands now almost as high in reputation and price as the products from Ireland and Denmark.

The poultry interests of Canada have been a neglected branch of our food producing resources. When the farmers give their thoughtful attention to this matter, the hens of Canada will do their part in increasing the food supply of the people. Great Britain imports poultry and eggs to the value of some $20,000,000 annually. The peasant farmers of France have amassed their competence which in the aggregate forms the basis of national wealth, largely from their poultry and eggs. In this, which has been called a minor interest, Canada has great capabilities of service for increasing the wealth of her people through furnishing articles of food—eggs and poultry—which are coming into increasing favour everywhere.

I will give you another instance, and this is with regard to poultry. When I was in Liverpool, I found one shipment of turkeys from Canada sent in common wooden boxes,—they had their feathers on and the birds were not even drawn,—selling like hot cakes at eighteen cents a pound. Canadian farmers seem quite content to sell their turkeys for ten and eleven cents a pound, and if they were sure of getting these higher prices,—and the market extends there even to the end of April, with higher prices than in February,—our farmers might go into the business of shipping poultry to England and make large profits.

Of the five farm products to which I have made reference, Great Britain imports annually to the value of some $216,000,000. Canada is the natural home for cattle. With her fertile soil and bracing climate she gives vigorous health to the domestic animals and freedom from all diseases of a serious nature. It has been reported that pleuro-pneumonia was found in some cattle which arrived in Great Britain from this country. If, by some supernatural or subnatural interference, the dreaded disease was found in cattle which arrived from our shores, it is quite certain that it was acquired after the animals landed and not while they were in this country, as it is not known, and has not been known to exist among the herds of our Dominion. Our customers in other countries everywhere may depend upon the healthful, wholesome and nutritious character of the food-produce which we supply.

(References were made to the trade in apples and other food products which attain their highest quality of excellence under the influence of our temperate and bracing climate.).....The quality of the food-products upon the people themselves can hardly be over-estimated, and in coming years, when the competitions incident to improved conditions of society make the struggle among nations for supremacy the greatest, the odds will always be on the side of those people who are well fed, well clothed, and who enjoy the comforts of life through the excellent food-products which they consume. In the one quality which gives food-products super-excellent value, the resources of Canada are being rapidly developed.

I refer to the quality of skill in agriculture which imparts to products the flavour the finish and attractive appearance which gives them their highest value both in cash to the producer and serviceability to the consumer.

With regard to the cattle exported to the old country. The exporters of cattle nearly all live in Montreal, and I do not think they are getting wealthy. I will tell you one thing I think they ought to do: they ought to try to get Canadian cattle to the English consumer as Canadian cattle, and Canadian beef to the English consumer as Canadian beef and if they do not, they will continue to get a less price in Liverpool, London and Glasgow.

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I went into a butcher shop in England on one occasion—a beautifully kept place. I went in and spoke about mutton. I said: "You have some capital mutton; where does it come from?" etc., etc. Then I asked, "Do you sell American or Canadian beef?" He answered: "You can get those only in rough shops where the cuts are cheap." His beef was eleven pence and a shilling, or twenty-two to twenty-four cents a pound.

I got a man who lived opposite to drive me into the country a few miles; he was a chatty man, and talked about the butcher shop. He said it was a fine clean shop. I said: "Yes, first rate. I suppose he gets all the cattle he wants right here." He answered: "No, he gets half a carload every week done up in canvas." He was getting American and Canadian beef and selling it as the best English. I could hardly find a shop where Canadian or American beef was selling under its own name. The ultimate consumer who bought the beef was not cheated, he got as good value, but by selling it as English, the retailer got too much profit. We ought to get more of the money over here which the English consumers pay.

I think the exporters ought to put their heads together and get Canadian beef sold as Canadian beef. When the consumer knows that it is as good as English beef, it will be sold for the same price, or nearly the same price.

I heard of one butcher, near Liverpool, who made £200,000 in five years by selling American beef and Canadian beef as the best English. By getting our beef at a low price, it being good beef, and selling it under another name, he retarded the development of the resources of Canada.

Let me revert to one thing more in that connection before I leave the cattle business. It is possible to develop the resources of this country of ours by getting feed for our cattle which is adapted to the conditions that prevail in this country.

This is not specially a pasturing country; very few cattle can be pastured for more than four and a half months in the year, so we have to provide food for cattle during the time they are not in pasture.

Corn stalks have been our best servant in this regard. But corn stalks are not a complete food and we have been buying cotton seed meal from away down in the Southern States to supplement them. What is the cotton seed meal? Something the sun got from the earth, air and water through the cotton plant away down South without the aid of very much human skill. I want you to drink in exactly what I am saying. That 'something' is carried a great many hundred miles on the railway. American railways never think of believing in and obeying the injunction, "As ye would that others should do unto you, so do ye unto them." You must add the transportation charges to the original cost and then put that 'something' with the corn stalks. I have nothing to say against cotton seed meal, but could not the sun do the same thing up here for us? I think he ought to. We could not get it through the cotton plant, but it is for us to find out some plant through which the sun will act.

The bean stalk is just the kind of plant that will enable the sun to act on it so as to get the constituents for feeding that cotton seed contains; and we can get that at home and put that with the corn stalks.

What further we need is 'something' containing more oil than the bean stalk, and you will find that 'something' in the head of the sunflowers. With these, we have a combination furnishing a complete food for cattle.

There are no railway charges on the corn stalk and bean stalk and sunflower heads. I have nothing against the railways. I think they are capital agents and agencies for developing the resources of the country, but I would rather let them make their profit out of carrying concentrated finished products.

I have talked in an informal way on the food-producing resources of Canada. In all the provinces we are co-operating with the provincial authorities for the improvement of the lot and position of the farmers. And I would be pleased to see the business men and professional men of our cities, the men who work in factories and labour in shops, as well as those who are employed in warehouses, do what they can do to help the men and women who live on farms to apply skill, intelligence,

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hopefulness and courage to their tasks that they might furnish better products, get better prices, and thus help on the prosperity of the country through the development of its food-producing resources.

(5.) ADDRESS BEFORE THE FIRST CONGRESS OF FARMERS OF THE PROVINCE OF QUEBEC.

QUEBEC, 24th January, 1893.

*Your Honour, Mr. President, Ladies and Gentlemen,*

Imitation is the most sincere sort of flattery; and I will imitate those who have spoken before me by speaking in my own mother tongue. It is with great pleasure that I recognize the splendid tribute that this meeting is paying to the importance of agriculture in the province of Quebec. I congratulate the farmers of Quebec on this manifestation of interest, on the part of all classes, in their occupation. It is full of promise for the people of this province that the foremost men of the country have come to honour this gathering with their presence, and to show their appreciation of the importance of the interests of agriculture in this province. I am very glad that this meeting is held under the auspices of your most distinguished citizen, the Lieutenant-Governor of Quebec, and that so much enthusiasm is evident.

Let me say one word on the importance of agriculture. I do not wear any article of clothing that does not come from some farm; I do not eat anything, excepting fish, that does not come from some farm; and, so, the outlook for our bodily comfort depends very materially upon the class of men who follow agriculture. The men who farm in the province of Quebec create much of its wealth, and the men who follow other callings acquire and possess its wealth until too often the farmer is left with too small a share of that which he has called into existence. The object of this meeting is that farmers may learn to create more, and that they may learn to acquire and retain a larger share of it for their own benefit. I congratulate you upon the character of the men attending this meeting, because they are a body of intelligent men. The more intelligence a man puts into his work, the better the work will be. Before and behind the excellence of all the products of the farm some one's mind must operate. I go to my field to harrow up the surface and sow the seed, in order that I may reap in harvest time: likewise to get a good crop of thought I must first have my mind harrowed, my consciousness sprinkled with good ideas. I must have intelligent purpose controlling my work and guiding my hands in it before I shall succeed in having good products. This congress will help the farmers to acquire that knowledge which will enable them to toil with more advantage to themselves, and to be something more than farmers who glory only in having hard hands. I honour a man who does his work well, and I honour a man for brawn and muscle and untiring strength and energy: but I honour still more the man who puts his mind above his muscle and makes of his brain the governing agent in all his work. The good Lord put man's head on the top that it should rule, yet I find men who misunderstand the meaning of life in all its aspects, and who work twice as hard with their hands as with their heads, because they seem to suppose that, since God gave them two hands and only one head, they are required to work twice as hard with their hands as with their head. That is a mistaken notion, and farmers must recognize that mind must go before muscle.

I desire to-night to do some thinking for you, to stir up your minds, that you may go home with quickened aspirations and invigorated mental powers. The better we farm, the better shall we succeed in all our personal and national aspirations and ambitions. Down in the province of Nova Scotia, I once watched men making some of the steel parts of agricultural implements—parts of reapers, hay-rakes and so on. I saw a great cauldron filled with molten steel spluttering and boiling like lard in a frying-pan; and I saw that steel afterwards take the shape of some man's thought. I bethought me that I had seen men in other tasks in life trying to make things take shape by hand labour alone, without any head work. If a man will try to beat steel into shape with the hands alone, he will have sore

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knuckles and no other success; and if a man will try to beat profits into his pocket through cattle and horses and sheep and wheat with his hands and ploughs and other implements alone, without the use of his head, he cannot succeed. Let us learn to make things take the shape of our thoughts, and then we shall have better butter, better cheese, better cattle, and better farms, and be better men. All these benefits should come from a Congress like the present.

The importance of agriculture is sometimes belittled by men who say that manufacturing industries only are what should be looked after by the Government. Farming is the mainstay of the prosperity of Canada. Canada has an area of land to the extent of twenty-nine times that of Great Britain and Ireland put together. Our country is twenty nine times as big, and we now farm only a very small portion of it, and farm it so badly that we have not the quantity or quality of the crops we should have, and do not get for our products the prices we should realize. I have seen butter selling in the markets of the city of Quebec for twelve cents a pound, and I have seen butter, with no more fat per pound in it, selling in Liverpool for thirty cents a pound. It takes less than two cents a pound to carry it thither. If the price obtained here was low, it was not because the markets were wrong: it was because somebody's thinking and practice were wrong.

The Governments of this country should recognize that the best way of helping the people of this country is by helping the farmers to reduce the cost of production through the application of more intelligence and skill in their work. The profit on products lies between the cost of production and the price obtained in selling; and, if a man can reduce the cost of production, he has profit at the safe end of his business. Permit me to mention one instance of this sort of thing. A farmer in the province of Quebec will give one cow three acres of land to roam over during the summer, then he will cut the crop from two acres more to feed the cow during the winter. He will get from that cow about 150 pounds of butter during the year, or thirty pounds per acre. Now, with a little thinking, aided by the helpful suggestions of my esteemed colleagues at the Experimental Farm at Ottawa, we grew Indian corn, English horse beans and sun-flowers—became quite *dilettanti*—Oscar Wilde sort of people, you know. We grew sun-flowers and English horse-beans to cheapen the cost of making butter. We obtained at the rate of 729 pounds of oil per acre from the sun-flowers. The beans were put into our silos with Indian corn, to be given to our cattle. I venture to think that from this new "Robertson Mixture for Ensilage" we can get about three hundred pounds of butter per acre against thirty pounds in the old fashioned way. Our efforts are to show how to lessen the cost and leave more profit. If we can induce many farmers to become, as far as it is possible for them, experimental investigators, in different parts of the country, it will be mightily beneficial to the Dominion of Canada.

At the Experimental Farm at Ottawa, we have been conducting experiments (not for the purpose of trying to do things in such a way as to glorify somebody for his achievements); we have been modestly trying to render some help to every farmer in Canada, that he may be able to do his work better and to make a better living for himself and his family. We have now an Experimental Dairy-Station established at St. Hyacinthe, in the province of Quebec, and I may be allowed to say this,—that much as the Honourable Louis Beaubien may do for the province, in his capacity as Commissioner of Agriculture, he will not be able to do anything which will be more fruitful of good results than this Dairy Station which he has promoted. I hope his life may be spared for many years, to render good service to the farmers of this province; but I venture to repeat that whatever he may do and with whatever his name may be identified it will not be identified with the founding of any institution which will render a greater amount of service to the common people than the Experimental Dairy School and Dairy Station at St. Hyacinthe.

You may have heard that some people in England have objected to the quality and name of some food products from the province of Quebec. Lately, while I was in Great Britain, the Honourable M. Angers, the Minister of Agriculture for the Dominion, sent me a cablegram asking me to shed a little light that might dispel the prejudices about Quebec or *French cheese*, which were blamed for being inferior,

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when in many cases they were certainly most excellent. A committee of the Bristol Provision Trade had recommended the association to adopt a resolution which practically classified all cheese from the French-speaking district of Quebec as being of a lower grade than "Finest Canadian" cheese. That action, or proposed action, furnished an opportunity for calling the attention of the merchants of Great Britain and Canada to the superior excellence of much of the cheese made in the province of Quebec during the past season. Throughout the Eastern Townships, and in the district of St. Hyacinthe, many of the cheese-factories turn out a product which pleases the merchants in some markets in Great Britain quite as well, if not better, than cheese from Ontario. If all the cheese manufactured in the province were brought to a similar or even higher standard of excellence, they might go with the name of "Finest Canadian" upon them, and bring additional credit to that brand. I know the people of Quebec are enterprising enough, courageous enough, and willing enough, to make an effort to manufacture and to send to England cheese of such quality as will win them a better name than they have hitherto enjoyed and fetch them a higher price relatively than they have heretofore received.

I must not make a long speech. I am admonished this moment that I have spoken long enough. I may, however, make a remark in excuse of the length of my address. I took some little pains, when addressing public meetings in Great Britain, to let the people there know what this province of Quebec was like. I did what little I could to bring before the people of that wealthy and spending country, that large food-buying country, a knowledge of the wonderful resources of this province, and of the people of this province, whose real patriotism, whose hopefulness, whose courage, whose aspirations, and whose enterprise, I appreciate very highly. I took some care to bring these things before public meetings in England; and the newspapers in England and Scotland were good enough to report some of the things I said. On my way home, I took some time on board the steamer to figure out the length of the reports of my speeches in England. By taking single columns of the papers which first reported what I had said, and by multiplying the length of reports by the number of copies of each issue of the papers, I found that I had a report of speeches about Canada and Quebec of the length of no less than five hundred and fifty miles. The public seemed to be willing to endure that; and I thought Canadians would be quite willing to have that knowledge of the country spread abroad, without a single cent being paid for advertising.

Competition in the markets is of a three-fold nature. There is the competition among buyers which helps to raise prices; there is the competition among sellers which helps to bring down prices; and there is competition between articles for preference in the markets. If a seller has a poor article of which he must get rid, he becomes timid, loses his courage, and is compelled to take less and less; so the market tumbles down, because somebody has cheese, or butter, or other product, which is not fine and for which he cannot successfully ask a good price. Often, you find the price of cheese or butter coming down because some one, or a great many some ones, has cheese or butter which is not what it should be in quality. In England, I had some butter which I thought should bring a high price. I saw one man who said to me, "I have just been selling Canadian butter for 90s. a cwt."—which was a low price. I said to him: "Was it good?" He said, "It was Canadian butter." "But," said I, "was it good?" He said "it was Canadian butter." "But," I said "was it good?" Still he said, "it was Canadian butter." I said: "It may have been Canadian butter, but it was not finest, it was not like this." It was Canadian butter, and that was enough for him in his effort to get the price down. He was bound to try and bring the general price down, because he had come across Canadian butter which was not up to the mark. If we could manage to prevent the production of any coarse bacon, strong butter, and ill-flavoured cheese, we should get twice the price for those who produce commodities of exquisite quality. I must tell you, too, that it is a mistake for the people of this province to go on shipping hay or the crude, bulky, or primitive products of agriculture, instead of butter, cheese, beef, bacon and poultry. Every ton of hay which you ship robs the land, and makes

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Quebec poor. You take from the land eighty-seven times more by raising hay and shipping it, than if you disposed of butter only. For the hay you may get $10 per ton, and for the butter—how much? $400 per ton. Four hundred dollars for the butter which takes off the farm about one eighty-seventh part as much of the elements of fertility as one ton of hay!

With reference to the cattle of this province, I may say that we have healthy cattle. I heard on the other side of the ocean of cattle which had come from Canada, and which were reported to be affected by a serious contagious disease. I said in Great Britain, and I repeat it here:—If these cattle were from Canada and were suffering from pleuro-pneumonia, they contracted it in Great Britain and not in Canada, as the disease does not exist there. Our food products are all healthy, wholesome, and honest to the core. A tub of butter from Canada is butter, and a tub of butter from some other places is sometimes cotton-seed oil, sometimes tallow, sometimes lard, and sometimes a mixture of the three. It is worth a good deal in England and elsewhere to have a merited name for honesty; and I hope Canadians will ever maintain their reputation for honesty, and an entire absence of counterfeits and imitations in their products.

England imported last year sixty-five millions of dollars worth of cattle and beef. We did not send very much from Quebec. I will tell you what we are doing at Ottawa. We are feeding some of these despised, half-bred Quebec cattle that are said to be ill-adapted for making beef. Last winter we fed twenty steers, and though the Quebec steers did not gain in weight as much or as fast as the Short-horns, they ate much less per head, and, consequently, gave as good returns for the quantity of feed consumed. If the farmers of Quebec would follow a wise course, they would learn to fatten and kill cattle here and send dressed beef to England. The beef from our dairy cattle is of superior quality, and would be sought after on the English markets. You can do that with profit and advantage to yourselves, and give the poor English workman a chance to obtain good beef at reasonable prices. Moreover, Great Britain buys fifty-six millions of dollars worth of butter annually, and we ought to send more of it from this country. By doing so we should not impoverish our soil, but we should enrich our pockets and make our dairy business more prosperous and profitable.

You can also feed swine here the whole year round, and should do so and ship the swine products to England. England imports fifty millions of dollars' worth annually, and is willing to pay the highest pride for Canadian swine products, because of their excellence.

The poor neglected hen—as treated in Canada—has done well for France; and England buys from outside countries no less than twenty million dollars worth of poultry and eggs. We are only beginning to appreciate the value of this undeveloped industry to ourselves. I will give you one instance which will go to show the possibility for a large and profitable business in the shipping of poultry. In Liverpool, I saw a large lot of Canadian turkeys which arrived a few days before Christmas. They were packed in plain wooden boxes, with the feathers on, and without being drawn. They were being sold, like hot cakes, at 18 cts. a pound, and must have realized a handsome profit to the shipper. This is only an indication of what may be done in poultry.

At our Experimental Dairy Stations, which have been established by the Dominion Government, we have the very agreeable assurance and consciousness that we are working in the fullest harmony with the Provincial Governments. And I may state of the province of Quebec, that I know of no part of the Dominion which is capable of having its natural resources more quickly, easily and successfully developed than this province. You have splendid pastures, plenty of pure, clear water, rich, fertile soil, cattle of robust constitutions, and people of enterprise with clear heads and good hearts. You have, however, one bad habit in your dairying business which militates against you. You may take the best of care of the milk and make good butter and fine cheese, but after making them you often buy miserable tubs and shabby, frail boxes in which to put them. You buy the inferior box, because it costs two cents less than a good box; and you send the cheese to England in them.

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I can tell you that the wretched looking cheese boxes, of a worse fit than a tramp's picked-up shoes, and the unsightly butter tubs of the Province of Quebec, have done great injury to the dairy farmers. The people of France have the reputation of putting up things in the most attractive and elegant packages. I suppose that is why the leaders of fashion look to France for their styles. In France, you find articles done up for sale in the prettiest and most pleasing manner possible. Now, you should put your butter into the best sort of neat tub, and your cheese in the best sort of strong, close-fitting box. You will then be better satisfied with your returns, because English people will pay higher prices for goods packed in that way than if packed in poor boxes or untidy-looking tubs.

I hope the people of Quebec will do themselves justice and vindicate my predictions about them in England. I have promised a great deal for you in the way of better performance; and if you go back on me, I will—I will learn to speak French in public, and come down the next opportunity I have, and scold you most unmercifully.

I hope also that you will send a creditable exhibit to the World's Columbian Exposition at Chicago—an exhibit of the products of this province of such excellence that you will secure for yourselves a good name; and, having done this, you will have the exquisite satisfaction of seeing your products sought after eagerly and yourselves immensly benefited. In Ontario, we have made a cheese for the Chicago Fair of 22,000 pounds weight! The purchaser guarantees to exhibit that cheese free to the public in every large city of Great Britain and Ireland after we shall have done it at Chicago; all of which will call attention to Canadian food products. Now if you want to make a bigger cheese in Quebec than that made in Ontario, when the next World's Exhibition is to come off, apply to the Dairy Commissioner, and Quebec may be chosen for that feat.

I wish you every success in all branches of your farming operations and shall ever count it a joy to do all that lies in my power to advance the best interests of the people of Quebec.

## PART VII.—MISSION TO GREAT BRITAIN.

In November, 1892, I received permission to visit Great Britain. A brief report on the objects and results of my mission was made before the Select Standing Committee on Agriculture and Colonization, of the House of Commons in March, 1893; and as the plates of the printed report have been stereotyped, part of that report is transferred here, to save the expense of setting up the same matter which would appear in only slightly different language if entirely written out anew.

### THE PURPOSES OF A VISIT TO THE BRITISH MARKETS IN 1892.

I went to sell the cheese and butter from our Experimental Dairy Stations; to make such arrangements as might seem desirable for marketing subsequent shipments from the same sources; to look into the newer preferences and needs of the British markets in regard to our food products, such as butter, cheese, beef, bacon, eggs and poultry. Butter and cheese were the commodities in which I was mainly interested, but as opportunity offered and time permitted, I made inquiries in reference to these other articles. Besides, I had it in view to use the butter and cheese which had been sent from our Experimental Dairy Stations, to advertise the excellent quality of Canadian products, to make known as far as I could the food-producing resources of Canada, and to present information upon the educational and experimental work which the government is carrying on for the benefit of the farmers. I had these matters in view, as well as selling the products from the experimental stations. I had it also in mind to discuss with the merchants of Liverpool, London, Manchester and Glasgow, questions of trade concerning such matters as qualities, packages, branding, weighing methods, and the most convenient routes and means of shipping, in order that Canadian goods might arrive there in the most satisfactory condition. I was furnished with a large programme of work; and

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when I got to the end of my time of absence from home, I think I was able to accomplish most of what I had set out to do. Let me give a review of the different objects and a very short statement of what I was able to overtake.

### PRICES REALIZED FOR BUTTER AND CHEESE.

In selling the cheese and butter, I got top market prices at the time, for all that was sold, with the exception of a small quantity of butter from New Brunswick, which we could not sell at the prices I wanted on account of the dullness of the markets. Some of it did not fetch satisfactory prices. A most demoralized condition prevailed in the butter market in Great Britain through January and February, from large shipments of cheap butters from Gemany as well as oleomargarine. I was also able to sell the mammoth cheese which we made at the dairy station at Perth, in Lanark County; and I would like for a moment to vindicate my own course in connection with that. A good many farmers and others have said to me: "Wherefore the need, or wherein is the advantage or wisdom, of spending so large a sum as $3,000 or $4,000 on a mammoth cheese?"

I was able to sell the cheese for the full amount it cost, including the cost of the labours, the press, the hoop and the truck that carries it, with this additional advantage to the country, that the merchant who purchased it will spend $15,000 in advertising it through the papers in Great Britain, and exhibit it in every large city of commercial importance in Great Britain and Ireland, at his own expense, as Canadian cheese. It will thus advertise Canadian cheese and call the attention of the great consuming public to the magnitude of our dairy business, and the resources of our country. After all, the investment of a few thousand dollars for a few months has not been a foolish move on the part of the department. I may state that Mr. Van Horne, President of the Canadian Pacific Railway, has been good enough to promise that he will arrange to send this cheese through to Chicago by special train and will have the facts advertised as to the date and the time of arrival at all stations on the road, so that the farmers and others, who may want to see the largest cheese in the world, may see it as it passes to the World's Columbian Exposition.

I made arrangements for the sale of future shipments in the four large distributing centres of Great Britain, viz., Liverpool, London, Manchester, and Glasgow.

I venture to believe I was successful in awakening a spirit of interest and curiosity on the part of the retail merchants about our Canadian food-products. There is an amazing ignorance on the parts of the retailers of the sources of the food which they handle. The wholesale merchants know well the exact localities whence they come, but the retailers and consumer are densely ignorant regarding the countries and districts from which the articles come which they sell and buy from day to day.

The way in which their attention can be attracted is through the newspapers and public meetings. There is commercial virtue in the making of something concerning our country or its products, so unique and interesting as to graft them into the every-day life of the people as topics of common conversation. A traveller who tried only to sell Canadian cheese would meet with little success in advertising Canada; but any one who can make the newspapers discuss the politics and philosophies of Canadian goods and foods, and can make them themes of conversation at the breakfast tables, can strengthen the demand for, and the consumption of our products, and thus help to increase the prices.

### CANADIAN PRODUCTS IN RELATION TO ENGLISH PREFERENCES.

Another object of my mission was to investigate the needs and newer preferences of the markets. It is necessary that we in Canada, who live so far distant in miles from those who consume a large proportion of our more concentrated food-products, should know their preferences. I have met a great many merchants as well as producers in this country, who say: "Well, let us send what *we* like, and let them take that or go without." The Englishman is not going to be bulldozed into unwill-

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ing obedience in regard to what he shall eat, no matter what he submits to in other respects. If he does not get exactly what he wants, put up as he likes it, in butter, cheese, bacon or beef, he will leave those foods and take to some other class of food. In Canada, we have been successful with our cheese trade, because our merchants have met the exact preferences of the consumers. Those countries which have not done so have been left out of the race. Let me give you an instance. In some parts of Canada it has been customary to produce a class of cheese which is not preferred by the consumers in London. It is of the colour that is not to their liking and the body is too soft to their taste. That class of cheese used to sell for a much lower price by the pound than cheese adapted for the London consumers. Recently discriminating selection on the part of our merchants has sent that class of cheese to Manchester, where it pleases very well. While our cheese from Quebec has been improved in reputation and quality, some of the advantage has resulted from directing that class of cheese to the markets best adapted for it.

In that regard my visit to Great Britain will help the Canadian producer by furnishing information which he might get from the merchant, and which, perhaps, has been tendered to him in the past, but which he had not heeded because of the feeling or suspicion that the merchant in giving advice might be influenced by selfish motives. Some cheese-makers and butter-makers have declined to act on the recommendations frequently given them by merchants. We have no time to educate the taste of the consuming public in Great Britain. One would need a few centuries of leisure to do that. Over there, one cannot but be struck with the prominent and peculiar aspects of the life of the people. I took many opportunities of studying other aspects of life, than merely the consumption of butter and cheese. If you map out into six sections, the time and thought that an Englishman gives to all subjects, food, clothing, house, family, religion, amusements, politics, philosophy and literature, you will find that five-sixths of his conversation is taken up in discussing the one subject of what he eats, has eaten, or is going to eat. As a result, he is a discriminating judge of what he should eat, and in selecting what he wants for his own palate. We who eat simply and innocently what is put before us, do not pay much attention to these matters, but an Englishman will go to a restaurant and select the particular chop or steak which he wants to have cooked for himself, and woe betide the cook if he does not prepare that particular one to his liking. When such a custom pervades nearly the whole community, it will pay us to learn what the people want, and to provide what they want and will pay the highest price for. The whole consuming public of Great Britain has a strong aversion to strong flavours in food-products. The average Englishman dislikes strong cheese, and I have known many cases in which strong-flavoured cheese sells at 4d. a pound less than mild cheese. They prefer mild-flavoured food of all kinds, and for that reason our Canadian dairy butter has gone out of consumption. The people who used to buy strong butter to spread on their bread, now prefer mild margarine. It is sold to them bright, clean-looking and sweet, and is displacing the use of pure butter on the tables of many of the people of Great Britain. If we make mild flavoured cheese and butter, and put them up in neat, attractive packages, I do not think that any imitation can compete successfully against the pure article. I can remember that within the last twenty years, the great masses of the working people in the large industrial centres in Great Britain found it difficult to get enough wholesome food to keep body and soul together. Now they are able and willing to pay for exquisites and delicacies for their tables. Shop-keepers have told me that the wives of workingmen in England are most fastidious in their choice of foods, and that they select the finer flavoured kinds, even if they cost high per pound. It therefore devolves upon us to do our utmost to please that class of consumers, and we can meet their requirements and preferences from the advantage which we possess in the matter of climate.

### IMPORTANCE OF BRIGHT, NEAT PACKAGES.

The English people are critical also as to appearances of packages, and the merchant thinks nothing of knocking 2 cents a pound off his bid for a tub of butter,



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if the tub itself looks shabby. A shop-keeper wants three profits off any article which he introduces. For instance, the reputation of Canadian winter-made butter has still to be made. For the present there is a prejudice against it. On the Danish butter, which is no better than ours, the shop-keeper is satisfied with a smaller profit. One of them told me that with a new article like Canadian winter-made butter, he had to push it. "In order to make it go at the beginning," he said, "I want a large profit." The shop-keeper wants to buy cheap, because it costs him more trouble in pushing it on the market.

### BRITISH PREFERENCES FOR NAMES.

The English people are conservative as to names. For "Best English" they will pay 20, 25 or 50 per cent more, under that name, than for the same article otherwise labelled. Sentiment has a great influence with them in that respect. There is a large share of sentiment combined with business in the ordinary consumer when he buys food. In some shops I found English cheese which was being sold at 22 cents a pound. Cheese of as good and in some cases of better quality than that (the best Canadian make) was selling at 14 cents per pound. There was a difference of 8 cents a pound due to the name. In some cases, I found that the cheaper priced goods were superior both in nourishing properties and flavour to those designated "Best English." Although "Best English" was fashionable as a label, the product was of only commonplace quality. We lose something in this respect, by not having our own goods known under their proper distinctive name. In many instances I found that the finest Canadian cheese was being sold as "Best English." If our cheese were somehow indelibly branded as "Best Canadian," people, *in time*, would begin to look for it under its own name; they would ask for it as such, and eventually we would get a relatively higher price for it. The same observations apply with regard to beef. I found that the best Canadian beef was being sold in many places as the "Best English." A pound of the best Canadian beef would not command as high a price under its own name as if it were sold as English. One service I was able to render the Canadian producers in that regard was by calling attention through the ordinary channels of communication—the newspapers—that our Canadian products were excellent and wholesome; and I endeavoured to induce people to ask for them at the provision shops under their own name. I found also that some importers on the other side had rather deficient information concerning both names and qualities of Canadian dairy products. The Provision Trade Association of Bristol—one of the large importing centres—had under consideration a resolution stating that they would not accept cheese from "the French section of Canada," as they call it, as finest Canadian cheese, because they had the opinion that several years ago cheese from that district was not fine. I was able to answer that objection, and offered to supply them with cheese from the province of Quebec, which is now selling for as high a price as cheese from any other part of Canada. We want to impress upon the British consumer that he should buy by quality and not by name; that he should judge an article, not by what it is called, but by its intrinsic worth.

If we can make our own name, the name "Canadian," the synonym for excellence and honesty in our products we will soon find the advantage. I found a difference in the qualities of cheese which are preferred in the different markets. Manchester wants a different style of cheese from Liverpool or London. I think I will be able to recommend certain districts to make cheese adapted to the preferences of these different markets. The faults that were complained of most in our goods were the shapes, sizes, and packages. In general appearance they are not nearly so attractive as those of the English-made cheese.

The style, as shown by the workmanship in finishing the article, is often quite objectionable. These little things to which our people have not given attention, are magnified into great defects and cause a discrimination against us in regard to prices. We also find that our butter packages and cheese boxes have been telling against us. The cheese-makers have been in the habit of buying boxes for one or two cents less

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than the price at which they can be made and nailed up sufficiently strong to carry their contents uninjured. Cheese arriving in broken boxes will sell for one-half cent a pound less than if the boxes were neat and undamaged. The good box costs 12 cents altogether, and it holds 60 or 70 pounds of cheese. There may be a loss of 30 or 35 cents for a saving of two cents in the price of the box. I had some boxes made in accordance with my own ideas as to strength, fit and finish; and there were six boxes a little bit broken out of a hundred, while in other shipments which I saw there were not more than six boxes whole in the hundred. That is a matter in which it will pay farmers to insist upon the cheese-makers paying enough to get substantial and nice-looking boxes. Our boxes from Ontario are better than those from the other districts in Canada and those from the United States. Yet there is much room for improvement.

The French people are the greatest sinners in this respect, as they send the most wretched looking of all the boxes I saw in the English markets. That is contrary to the traditions and practice of the French race in other affairs. In France, the people have the happy faculty of putting up what they manufacture in the most pleasing and attractive manner; but in the province of Quebec the people have been neglecting the appearances of packages.

### IMPORTANCE OF BRANDING TO PREVENT FRAUD.

In the matter of branding, I think it would be advantageous to have the cheese made in Canada, branded "Canadian," on the cheese as well as on the box. The making of this compulsory might be a little distasteful to some of the cheese-makers at the beginning, but if it were made permissive for the first year, I think most of the cheese-makers would avail themselves of it. The members of the Produce Exchange of London made very strong representations to me on this matter, saying that Canadian cheese should be branded "Canadian" on the cheese as well as on the box, because they had good reason to believe that very frequently cheese were tendered to them on contract under the name of Canadian cheese, which was not produced in Canada. One way to guard against this misrepresentation would be to have the name "Canadian" branded on the cheese when made and on the boxes afterwards. I think we might do this with advantage. We should insist on having the name of the country where the cheese and the butter are produced, branded upon the outside of every box and package which is shipped from any Canadian port to any foreign port. I would not like to see any regulations made which would be harassing, and which would tend to restrict the trade which has grown to considerable magnitude in handling cheese from the United States through our country to Great Britain. This came up in the course of my investigation. I found that a large quantity of cheese from the United States, northern New York State and the Western States of the Union, went through our country in bond, and was bought in Great Britain as cheese from the United States. The bulk of the business is carried on honestly and honourably, in my opinion. There is very little misrepresentation. The business is done mainly by Canadian merchants, and it has grown up for the reason that Canadian merchants are the better judges of the quality of the goods their customers in Great Britain want. The men in this trade in Canada have grown up having a practical knowledge of the trade in all its branches.

The trade in New York and Chicago is largely managed by men who are in a sense speculative business men, instead of being men who are personally practically acquainted with the qualities of the goods they handle. Therefore, our people are able to handle them with better results. Besides, ours is a cooler route than the other routes to the Atlantic seaboard. It is because we have these two advantages that I would not like to see any restriction imposed which would make the trade difficult to be extended or any regulations harassing to those who carry it on. I think if it were enacted that the brand "Product of the United States" should be upon the outside of every box or package before it left a Canadian port for a foreign port, it would not interfere with carrying on the trade in a pleasant and satisfactory way. If the cheese should come to Montreal without bearing this brand



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the proper customs officer or any other official appointed to do so, could see that the brand was put on, making a charge of two cents a box. The transportation company should be required to pay the amount with power to charge it against the consignee as necessary expense incurred to comply with government regulations. That would be a simple way of doing it without any offensive regulations or irritating restrictions. I think also that some one in Montreal should be given charge of looking out for shipments of cheese and butter, when they go through in bond and go direct from the railway cars or local steamer into the ocean steamer, in order to see that the cheese and butter which are not warehoused or stored in bond, carry the brand that designates their origin. There is quite enough room and work for an inspector there to look after Canadian interests. I make this mention in this regard, because I was favourable to a movement like this last year. The matter was discussed in western Ontario and from the published reports I received of those meetings, I found that the farmers were expressing hostility towards the departure, because it had been supposed that the inspector would be there to brand the cheese, grade it, and make himself disagreeable generally.

One buyer objected to an inspector at Montreal, apparently because the inspector could prevent any cheese going through from Chicago from being put on the steamer without bearing a designating brand of the country of production. The hostility was on the part of those who have been reported as shipping cheese from Chicago and other western points quite largely through Montreal without any brand at all being on the boxes which designated where they were made. That was reported to me in Liverpool, London and also in Montreal.

I think we should brand on all cheese made from skimmed-milk the words "Skim-milk;" and on cheese made from whole milk the word "Canadian." I would leave the word "Canadian" off skim-milk cheese. We are not anxious to advertise it as from this country. We should have a regulation prohibiting the making of any filled or imitation cheese. There is none made in Canada now; but during the last winter a large joint stock company was reported as proposing to start this business, they were restrained from it by the statement that the government would certainly prohibit the making of filled-cheese as in the case of oleomargarine.

*By Mr. McMillan (Huron)*

Q. There was a Bill before the House last session to make it imperative to have a butter and cheese inspector at Montreal, and to have sales subject to that inspection?—A. I think that would be quite impracticable. Any food product which is perishable in its nature cannot be branded or graded like flour. Butter may be graded No. 1 to-day, and if exposed to hot weather in transit, it would be No. 3 to-morrow. In that way a government brand upon butter would be subjected to ridicule on the other side.

BRITISH IMPORTS OF CHEESE, BY COUNTRIES,—VALUES.

The imports of cheese into Great Britain in 1891 were as follows:—

| | |
|---|---|
| Holland | £ 761,387 |
| United States | 1,779,260 |
| Canada | 1,991,597 |
| New Zealand | 74,257 |
| | £4,606,501 |
| All other countries | 206,903 |
| | £4,813,404 |

I believe there is a preference among the wholesale dealers over there for Canadian cheese over that sold under any other name; and if we maintain the fine quality we shall continue to retain a large share in the cheese trade with Great Britain.

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BRITISH IMPORTS OF BUTTER, BY COUNTRIES,—VALUES.

The imports of butter into Great Britain in 1891 reached a total of £11,591,183, made up as follows:—

| | |
|---|---|
| Sweden | £1,269,187 |
| Denmark | 4,865,842 |
| France | 3,038,063 |
| Canada | 187,398 |
| Australasia | 270,880 |
| All other countries | 1,959,813 |
| | £11,591,183 |

It will be seen from the foregoing figures that Great Britain imports butter to the extent of two and a half times the value of the cheese. Her imports of margarine, in 1891, amounted to £3,558,203. It will, therefore, be readily observed what a capital chance there is for the extension of our trade in butter to the mother country. Considerable butter might be sent from Canada with advantage to ourselves, reaching there in October, November and December. Those who have any influence with the large transportation companies should endeavour to impress on them—the steamship companies especially—the need for providing refrigerator accommodation for our shipments of butter in the fall and early winter before the cold weather prevails.

THE QUALITY OF BUTTER WANTED IN ENGLAND AND HOW TO PUT IT UP.

The qualities of butter which the English people want are a fresh-made flavour, without any evidence of staleness. They also want a very mild butter—that is, not heavily salted. Further, they want it pale in colour. In our attempts to secure the market, much depends on the manner in which the butter is put up. Let me show this tub to the committee, for a moment. The British importer is a great stickler for requiring a nice-looking package. The tub which I now show to the members of the committee, I brought, in order that the gentlemen might, in their own districts, advise the shop-keepers to try and introduce a package like it. It is different from the tubs which are generally in use, and I will point out a few of those differences. In the packing of butter, where tubs have been finished with iron hoops in the past, these hoops have not been painted, and the rust from the hoops stained the wood and made the tub look nasty on the outside. The farmers and shop-keepers assert that paint on the outside of the tub will affect the flavour of the butter, but that is a mistake. The paint on the outside will never affect the quality of the butter inside. Butter might be kept in this tub for six months, and it will look as well as the first day it was filled. The English purchaser, if he finds the butter inside to be of good quality, will pay a good price for it. The ordinary butter package of to-day is made with a band on the cover, which extends over the side. In handling, it is often broken and the cover falls to pieces. This has a cover of double thickness, made with a shoulder which fits into the tub. The extra cost of the cover, the lining of paraffine and the painting outside, is about 12 cents per tub, or less than a quarter of a cent per pound of butter. The butter will bring, say from 1 to 1½ cents per pound more. We have also branded on the top of the cover, the words, "Dominion of Canada." The Australian and New Zealand butter-boxes are lined with paraffine paper. The result is that the butter, on arriving at Great Britain, has a sparkling appearance on the surface, and looks for all the world like fresh-made butter. Let me give an instance of how an Englishman chooses butter. It shows what may be gained by our people by paying attention to little maters. The British retailer goes to buy butter from the merchant in his warehouse. He will use a shilling or the end of a knife or a key to take a very little off the very surface of the butter. If he uses the butter trier he will run it

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down close to the side of the tub. In each case, the butter is judged at its very worst points. Then, having tried the butter and fixed the standard in his own mind, he will endeavour to purchase the whole quantity he wants on the verdict of that examination. On the other hand, the man who wants you to buy butter and invites you to examine it, will bore down the middle of the tub and ask you to judge the whole from that point. In commerce, the man who wants to buy, tries to reduce the standard of quality to as low a point as possible, while the man who wants to sell desires to make the standard as high as possible. Now, if we pay attention to these little points, it will be money in our pockets. We want a nice, clean looking tub, with good cover and proper lining. When we use these it will be to our material advantage. Excepting one shipment, (one lot of cheese made at Perth, Ontario), the butter and cheese we handled were handled for the farmers who furnished the milk, and they are to get the prices which were realized net. Whatever is handled by us is handled as trustees for the patrons, and not as government property. There has been one exception to the rule. A portion of the butter made at Mount Elgin, during the winter of 1891–92, was sent to Liverpool and held there by the consignee contrary to my instructions, and against all the advice I could send. It was sold at the end of May, against grass-made butter, having been kept in his warehouse two and a half months there. That butter sold at a low price, and the fault was not that of the farmers, and not mine, except in so far as I sent it to a man who did not carry out my instructions. I recommended to the Minister of Agriculture that that butter be paid for at the same price as the other butter which was sold promptly on arrival. The loss to the department from the whole transaction was about $250. The farmers were not paid any fictitious values, as a statement of the facts was made in the circular which was issued to them at the time.

### CANADIAN SWINE PRODUCTS IN GREAT BRITAIN.

In the matter of swine products I have only a few observations to make. I found an active demand in London and Liverpool for Canadian fed and Canadian cured bacon; it stands next to the Irish and Danish swine products which have the highest reputation and fetch the highest prices. I have nothing to say that would look like a complaint of the conduct of the men running the packing-houses in Canada; still it is my duty to say this: That Canadian-cured and Canadian-fed bacon was selling in London and Liverpool for within five or six shillings as much per 112 pounds as Danish-fed and Danish-cured bacon; whereas the Danish farmers last summer are reported to have realized from 2 to 3½ cents per pound more, live weight, than the Canadian farmers, and the freight rates from Denmark are not much lower than the freight rates from Canada. The packing-house men and the farmers can draw their own deductions. As our Canadian name gets better known our products will be sought after at such enhanced prices that the men who cure them and handle them will be able to pay higher prices to the farmers and still make a good profit. In fairness I must state that at the Danish packing-houses, a larger revenue is realized upon the offal and by-products; and the wages of the workmen are lower than in Canada. For several years they have been going in for a breed of swine like the Chester White or Improved Large Yorkshire crossed with the Berkshire. My information is that these are the breeds most used in Denmark now; I have heard of some Tamworths also being there.

### BRITISH IMPORTS OF SWINE PRODUCTS, IN 1891.

The imports into Great Britain of swine products in 1891 amounted to £11,760,469 stg. We can increase our output of swine products very much by turning our coarse grains that way. We might double the output in one year.

### CANADIAN BEEF IN THE MARKETS OF GREAT BRITAIN.

Now in the matter of the beef trade. To discuss the live stock trade satisfactorily would absorb the whole of my time this morning, and I must be content to

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present only one or two aspects of it. At the large agricultural conference which I attended while in London, it was stated from the platform by a Member of Parliament who said he could furnish the data required to prove his statement, that one retail butcher in the Midland counties of England had accumulated a fortune in five years of £200,000 by selling the best American and Canadian beef as the "Best English." The gentleman who was speaking was addressing the conference as an English farmer, interested in getting the best prices for the British home products; but it struck me that if a man could acquire a million of dollars in five years, by handling our beef under a wrong name that Canadians ought to get a larger share of the ultimate retail price. A rightful share of the profits would come here if we got the purchaser to know that when he is buying so-called "Best English" beef he is really purchasing the "Best Canadian." Let me give you an instance of how this works. I went in to an average butcher shop in a country town where I was visiting. I praised his shop and asked the butcher about his trade. Then I put the question to him, "Do you sell American or Canadian beef?" to which the reply was: "You can find American and Canadian beef only in the rough shops where the cuts are cheap." Beef was being sold in his shop at 10d. to 1s. 1d. a pound, or from 20 to 26 cents per pound. A little later, a livery man of the same town drove me a few miles into the country. He was not averse to talking; in fact he was very communicative and wanted to talk. Presently I brought the subject round to the trade of the village butcher, whom I had interrogated a little while before. I asked the livery man if the butcher received any dressed beef in canvas from Liverpool. "Oh, yes," he replied, "half a railway truck full every week." I pursued my line of investigation until I was convinced that the man who only sold the "Best English," according to his own statement, was really selling three-quarters of the best American or Canadian-fed beef and selling the whole under the name of "Best English." Now, I think the English farmer has good reason to complain; and we have a right to complain also that we do not get the excellence of our beef brought fairly before the English public.

A good many articles and letters have appeared in the newspapers over there, on the part of Scottish farmers especially, in which an ardent desire is expressed that our trade in stockers should be resumed in the summer. They are not at all pleased with the action of the Imperial Government in putting restrictions on the shipment of our cattle after they are landed in Great Britain. The Scottish farmers have been making a good deal of money by fattening our lean cattle. As one instance of this, let me mention it as illustrating the folly of sending lean cattle to Great Britain. I use those words advisedly. A good many farmers have not, as yet, facilities for fattening cattle; and it will be a hardship to them if the stocker trade is discontinued. But if our farmers could fatten cattle to a finish they would make more money. I met one man in Aberdeen County who had just returned from the city. He had just bought a quantity of Canadian hay at £7 per ton with which he was going to feed the lean steers which he had got from Canada awhile ago. He had bought Canadian steers, intended to feed them on Canadian hay and will make money out of them.

### THE SELECTION AND PACKING OF EGGS FOR THE BRITISH MARKET.

The next matter I have to mention is the trade in eggs. I found, particularly in Manchester, that Canadian eggs bore an excellent reputation in the trade. In London also, the reputation stood well. The only circumstances that I heard mentioned against them was the fear that some of them might be stale and rotten. When a feeling of timidity like that spreads through the trade, it takes a long time to eradicate it. If we want to get our eggs to that market, it will pay our farmers to get them to the local merchants and packing-houses regularly and quickly.

The eggs should be collected once or twice a week and put at once into refrigerating compartments. Gathering them in that way we will have a large and a steady demand for our products. The wholesale merchants told me that if half a dozen or fewer eggs in a case were spoiled, it destroyed the retailers' confidence

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in them and they would not buy them at all under any name. It was not the percentage of spoiled eggs; it was the fact of their being there at all that destroyed confidence and brought prices down.

### DEMAND FOR CANADIAN POULTRY IN GREAT BRITAIN.

I think in the matter of poultry, Canadians may develop a large trade with Great Britain. That market seems a long way off to be reached with fresh poultry. In Liverpool I examined a shipment of turkeys shortly after they arrived. The feathers had been left on the birds, and they were not even drawn. They were shipped in rough boxes, and these turkeys arrived in most excellent condition. I plucked the feathers from the breasts of some of them, and the flesh was as firm, fresh and sweet as the day they were killed. They were being sold like hot cakes at 9d. per pound. It was reported that the shipper made £600 sterling out of that small shipment. I found on inquiry that instead of there being an active demand only before and after Christmas, there would be a capital demand for Canadian turkeys up to March. I think we might develop a trade in this with great advantage, because Canadian farmers can grow turkeys quite as exquisite in flavour, as tender in meat and as cheap as they can be grown in any country. The men who buy turkeys now, properly fattened and prepared for market, can handle a larger quantity with profit.

### RECEPTION IN GREAT BRITAIN.

There are only a few matters more to mention in connection with my English trip, because, as I said in opening, I must not detain you with details. One of the objects of my mission was to reach the public ear and eye with an intimation which would be remembered, of the excellence of the qualities of the Canadian products; to announce to British farmers what the government was doing in the way of agricultural education through the Experimental Farms and Dairy Commissioner's office, and to give some information on the food-producing resources of Canada. I might mention to the committee that I had a unique privilege and advantage in reaching England, being the bearer of letters from His Excellency, Lord Stanley of Preston. I mention this because in half a dozen ways and on many more occasions, His Excellency has done very much to promote the interests of agriculture in Canada—(Hear, hear)—for which he has not received, so far as I know, full credit in public. While I was able to get a large amount of space in the English and Scottish journals for Canadian affairs in connection with agriculture, a considerable share of that came from the advantage I had in carrying letters from His Excellency. While I have been congratulated on all hands for the success of my mission, it is my duty to say, that in this case the power upon the throne deserves most of the praise.

I need not speak of the meetings beyond the fact that both in Liverpool and in London I was given most enthusiastic receptions from the merchants there. Time did not permit me to accept further invitations which were extended to me from Bristol, Manchester and Glasgow. The Liverpool merchants had arranged to have the proceedings of the meetings thoroughly reported, and let me say that although some have supposed that the articles which appeared in the British press must have been paid for to a pretty loud tune, there was not a single cent of money spent in that way. It was all done by the editors and reporters as a matter of courtesy, and in the interest of their own readers. This aspect also may be worthy of notice, seeing that the committee have to do with colonization. While the reports of my addresses in Great Britain were quite full, these reports were also copied largely in the continental papers of Europe.

I have received recently papers from Sweden and Denmark giving a translation in full of a report of one of my addresses in Great Britain published for the benefit of the farmers in Sweden and Denmark. I think that will have a decided influence in the direction of getting the best class of emigrants from these countries to come to Canada, in view of what is being done here to enable the farmers to better their circumstances and follow their business in the most successful way. The reports of

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the meetings themselves were quite lengthy. I have twenty sheets here of clippings of original reports in the best papers in Great Britain. The whole multiplied by the number of copies issued foots up some 550 miles in single column length.

There are a great many matters which I must leave out to-day. I attended the great national conference which met in London to discuss agricultural depression. I have been twitted since I came home of either ascending or descending into the arena of political party discussions by expressing opinions upon protection in Great Britain. Some of the newspapers have honoured or abused me by basing editorial articles on my references to that unprotected subject. I discussed protection in this sense in England. I attended a large conference in London, where every reference favourable to protection—(a protection against Canadian butter, cheese, beef, wheat and other products)—was received with uprorious applause. Every kind of food-product we send from here was to be taxed for the benefit of the British farmer and land owner; and in the intensity of my desire to serve Canada, I objected to that kind of protection. Besides, most men will find on going to Great Britain, that if they desire to secure any public attention to the work they are trying to do, they must introduce into whatever they write or say, something relating to the burning questions of the hour, there. If I could introduce something intimating the excellence of Canadian cheese, butter and beef to a larger and more interested number of listeners or readers, I would talk on any lawful subject. This was all I had done. I had used this work and subject, which have been vilified and deified in political discussions, as I thought best to serve the interest of the Canadian farmer.

(1.) *From "The Canadian Gazette," London, England 15th Dec.*, 1892.

## CANADA AND THE AGRICULTURAL CRISIS.

By the Dominion Dairy Commissioner.

At the present juncture in the experience of British farmers—and I use that term in the widest sense to include the Greater Britain which lies beyond these island shores—it becomes the particular duty of every one who can contribute a mite of information and thought to the discussion of the causes and remedies for agricultural depression, to do so with all modesty and sincerity.

### CHANGED CONDITIONS.

One of the chief drawbacks to the progress of agriculture and the profits that should be reaped by those who follow it as an occupation has arisen from the fact that farmers forget how much they can help each other by discussing their common interests. Somebody's careful and clear thinking must precede and underlie every measure which makes for the improvement of the conditions of those who create the world's wealth—whether it be by tilling fields, making roads, erecting houses, or providing the many snug conveniences which modern life demands in the country in as full measure as in the cities.

In Canada, as in England with its denser population, the interests of the manufacturing and agricultural classes are not quite identical in every way, but they are always harmonious. The interests of the commercial classes, whose occupation arises from the means of distribution, are sometimes not only directly competitive, but actually antagonistic to those of the producers of food, clothes, and other material conveniences which have become the common necessaries of life.

The enlargement and improvement of transportation facilities have brought about changes in the conditions of marketing the products of a farm, to the extent that the producer who lives on the other side of the globe has become a next-door neighbour in market competition. These changes have not been wrought by the will or enterprise of any one man or one class of men. They are the common achievement of all those forces which have been at work in the progress and consolidation of our English-speaking civilization.

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### ISOLATION AND FALSE HOPES.

What has the farmer been doing while these great changes have been altering his surroundings? The British farmer, like the farmer in Canada and elsewhere, has, in too many instances, allowed his seclusive and exclusive disposition to stand in his own light. The producers of other articles of common consumption have adjusted their methods to the new and changed conditions. The farmer in England and Canada has, in too many instances, stuck to the style of farming which was adapted to the conditions of market and life of forty years ago. He has farmed as a more or less isolated unit, and as his forefathers did, and the inevitable outcome is financial embarrassment, if not utter loss of capital and of heart. Some experts have tried to lull him into a sense of satisfaction by pointing to a bright future when the American and Australian continents will be peopled so densely that those who are now exporters of food will consume all they produce, but that is idle talk. The power of production of these new continents will undergo indefinite expansion as population increases, and to indulge in such imaginings of a bright future is worse than half doctoring a symptom to cure a constitutional illness. It is administering a sleeping powder to an exhausted patient in need of food. The inevitable outcome of this isolation and this reliance on false hopes has been in very many cases financial embarrassment, if not utter loss of capital and heart, and the agriculture of Great Britain and her Colonies has been brought face to face with a calamity which has only been half-perceived by the men who generally mould the opinions of the nation by the announcement of their own. The condition of the farmers, in more senses than one, threatens the honour and the stability of the nation. How has Canada sought to meet the danger?

### EXPERIMENTAL AND EDUCATIONAL WORK.

In Canada the Government has been endeavouring to improve the condition of farmers along certain lines, which promises great benefits to those who till the soil there, and furnish the food of the people. The work undertaken has been mainly of an experimental nature, that it might be educational in its influence upon the ordinary farmer of the country. A few years ago an Experimental Farm system was established, with headquarters at Ottawa and Professor Wm. Saunders as director. Ontario had its Experimental Farm sixteen years ago. Branch Experimental Farms have now been established and equipped in the widely separated provinces, in order to discover the varieties of grain, breeds of cattle, and varieties of fruit which are best adapted to the different conditions of soil and climate. Provision has also been made for the distribution to the farmers of small sample bags of new and promising varieties of grain. These were sent out last year to the number of over 15,000. The farmer who receives these samples of grain receives a variety of seed of the very best quality without expense to himself, and can speedily suit his seed to his land. From the sample bag, which is sent by mail, as much as two bushels are frequently obtained from the first crop. From watching the growth of these new sorts of grain with particular and quickened interest and care, the farmer becomes a more observant and capable agriculturist.

### THE COMPETITION THAT KILLS.

The Canadian Government is also making strenuous efforts to further improve the quality, enhance the reputation, and increase the active demand for Canadian butter and cheese. English farmers have small cause to fear the competition of Canada in this regard. The kinds of cheese which lower the price most effectively are those which are of inferior quality, from being made where the surroundings are filthy, the people themselves untidy, and the climate, cattle, and fodder unsuitable. A fancy cheese from Canada (which, pound for pound, is equal in nourishing qualities, rich flavour, and mellow body to the finest English Cheddar) tends to create a more general and active demand for this excellent class of food. In creamery butters the Canadian Government is also promoting the development and extension

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of the manufacture of butter during the winter months. Six of these Experimental Dairy Stations are now controlled by the Government in the different Provinces, and the butter from them will find its way into the British market during the winter months. Here, again, the superficial observer is apt to imagine that the competition from this cause is detrimental to the English dairy farmer. As a matter of fact, in his own markets the English farmer has least to fear those wholesome and honest products and producers who send only the best quality of food commodities to meet demands of the consuming classes.

In all markets a three-fold competition exists—a competition between buyers which tends to raise prices, a competition between sellers which tends to lower prices, and a third competition, which is too often forgotten, between products for preference in the markets. It should not be hard for an excellent quality of anything to displace a poor quality of the same kind of goods; but the producer in Canada has to meet in the markets of England with a most unfair competition which has wrought also the greatest injury to the live-stock interests of Great Britain. The English, the Irish, the Scottish, and the Canadian farmer have all had to meet the unfair competition of counterfeits, in substance and in name which by their low price per pound have turned the consumption from more wholesome, more nourishing, and, on the whole, cheaper, honest animal products.

### PROHIBIT IMITATIONS.

Many instances might be given. The most familiar are perhaps, the subterfuges by which tallow, lard, and cotton-seed oil are sold in enormous quantities in England in the place of English, Irish, Canadian, or Australian butter. Of course, the imitation is sold wholesale, and probably sold retail, under a distinctive name; but the distinction extends only to the label of the package, the shop-window ticket, or the wrapper of the piece of coloured fat. Neither the Imperial nor the Colonial Parliaments can, by their fiats, legislate good times; but it seems to me that both can and should legislate in the direction of good times by prohibiting further competition with imitations and counterfeits which prevent the remuneration of honest British toil, applied to the production of honest British products, for the nourishment of honest British men. A simple remedy for this might be indicated, and it points to a method which may be applied with advantage to several other lines of farm products. Let the colouring of any fatty substance into an imitation of butter be prohibited.

Experiments conducted at the Government Experiment Stations in the United States of America have shown that the bones from swine which are fed upon corn, exclusively or mainly, will break with the application of less than half of the pressure which is required to break the bones of animals of similar breeding which have been fed upon grains or dairy by-products. The vital organs of these corn-fed animals are also much smaller and their health less robust. Can the flesh from their carcasses be as nutritious or wholesome? Would it not be a wise measure, in the interests of the health of the toiling masses of Great Britain, to insist upon a clear and unmistakable means of designating to the ultimate consumer the source whence all the animal products which are offered for sale have originally come?

### A NEW PROTECTION.

Any legislation looking towards the regulation of diet is called offensive to the English-speaking people; but that class of legislation which would protect the poor man from buying a pound of lardy bacon, a pound of oleomargarine, or a pound of "filled cheese," under the supposition that he was getting in these things real value and food which was adequate for the nourishment of his muscles, nerves, and bones, would be a boon to him, which he would not long suspect or complain of as being arbitrary. The effect of the quality of the foods which are produced in these Northern climes upon the constitution, vitality and vigour of the race is one which should not be ignored in any fiscal policy which has in it the elements of directing modifying, or regulating the source of a nation's supply of food. The difference

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between a Scotchmen—the finished product in a material sense of oatmeal and the shorter Catechism—and a hundred Chinamen—the embodiment of rice and the Confucius' confusion—is, as I have said before, evident to all students of the material sources of race energy.

The compulsory specific labelling of animal products with the name of the country and place of the original production and shipment will look to some like the entering of the thin edge of the wedge of Protection, and will seem to stir up a warm tumult of confused ideas and sentiments of hostility from those who use the word and apply its spirit in every other relation of life with beneficence. Protection in the sense of taxation of the consumer to increase the price to the producer can be no permanent remedy for the present depression among farmers; but some protection of the interests of the farmers in Great Britain and the Greater Britain must needs be evolved, which will ensure them fair play and fair pay.

### THE LANDLORD'S PART.

In the Dominion of Canada, the landlord question is one of no appreciable moment, but the problems which face the Canadian farmer for profitable solution are almost identical with those which have to be met by his brother on the English side of the Atlantic. A new life seems to have been put into the agriculture of the Dominion by the movement in favour of information and education about their own business which is sweeping over Canada like a great wave of an agricultural revival. His Excellency the Governor General, Lord Stanley of Preston, from his practical acquaintance with the difficulties of farmers' work as well as its needs and opportunities, has lent invaluable help to this forward movement, which has its first fruits in the mitigation of the financial conditions of the farming communities, giving, especially in Ontario, larger and better crops and higher prices, and in the advancement of their moral, intellectual, and spiritual well-being. Are not these directions in which the British landlord may help the farmer? A long sustained effort to give the farmers in the whole of the whole of the British Dominions a better knowledge and more thorough and comprehensive acquaintance with the principles which underlie the different practices in their own occupation, and to inspire them with well-founded hope and confidence in its capabilities to afford them a good living, a leisure, and a competence, should not be the least of the benefits flowing from the present discussion of agricultural depression.

For my part I am inclined to be sanguine. The present agitation will not, I hope, die down and leave the farmers more dispirited than they have been before any prospect of deliverance had been mooted to them from a measure of fair play in their own markets for their own products. An organization of farmers does not create any energy, but it makes it possible to control the energy of its members with intelligent purpose, and to direct it to the attainment of desirable ends. I have faith that the good sound sense which has characterized the British people, and which has wrought their deliverance in the past from many impending dangers, with plucky disregard of fine-spun theories from those who have not come into contact with the struggling lives of the common people of the nation, will again enable them to work out their economic salvation, and bring British farming back to that condition of honest profit-making which it ought to enjoy.

JAS. W. ROBERTSON.

(2.) *From "The North British Daily Mail," Glasgow, Dec. 17th,* 1892.

## REMEDIES FOR AGRICULTURAL DEPRESSION.

There is a lesson which the British farmers may take from Canada. Canadian farmers have also had to fight against depression, low prices, and an adverse tariff. The crisis is being met by measures which already seem to have put new life into the agriculture of the Dominion. How is this done? Not by protection or bi-metallism. The secret lies in finding out improved methods of work, and stimulating

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self-help, increased energy and resource on the part of the farming community. The Dominion Government a few years ago established a system of Experimental Farms. We have before us in the shape of official "bulletins" the details of some of the experiments which have been carried out at the Central Farm during the last two years. An examination of these reports is enough to show that such experiments are bound to be of very great practical utility to farmers. One document, for example, shows the comparative value, ascertained by careful tests, of different feeding-stuffs for the fattening of steers: another bulletin gives the results of experiments in the fattening of swine: and from either the one or the other the farmer may ascertain the best and most economical method. The annual report of the Dairy Commissioner, issued in Blue-book form, and a reprint of the evidence given by Professor Robertson before the Select Standing Committee of the Dominion House of Commons on Agriculture and Colonization, give a striking impression of the extent and the value of the educational work which is being carried on amongst Canadian farmers through official agencies. On the Experimental Farms trials are made of the sorts and varieties of grain which are best adapted to different soils, climates, and methods of cultivation; different breeds of cattle are kept and experiments made to find out the effect of different fodders upon the quantity and the quality of the meat or milk produced. An individual farmer could scarcely afford to make these experiments for himself. Here, then, is a legitimate opportunity for the Government to step in to his assistance. The same thing might be done in this country, but there is a difference between the circumstances of the Canadian farmer and those of his British brother. We have a landlord system, which Canada has not.

There is great truth in a remark passed by Professor Robertson that "a landlord who is a real leader of men is underpaid by a rent-roll; a landlord who is only identified with his estate in the collection of rents is a misfortune indeed." The landlord community might do for their tenants what the Canadian Government are doing for their cultivators. Some landlords do undoubtedly recognize their duty in this respect and endeavour to fulfil it. But until not "some" but all landlords do the same—until it is recognized, as it ought to be, that landlordism can only justify its existence by the degree in which it contributes to the promotion of agriculture —the British land system will never be in a satisfactory or permanently stable condition. If landlords are to exist at all, they must not remain an unproductive class. A large landowner concentrates the surplus resources of a whole community. It is a good thing for those profits to be so concentrated if they are employed in effecting measures for the common good which would be beyond the means of any individual farmer to accomplish. By making himself the centre and agent of co-operation amongst his tenants a landlord becomes no longer an unproductive member of the community and a mere burden cumbering the soil. He may be the most valuable man on his estate, and, as a "real leader," to use Professor Robertson's words, he will not be underpaid out of his rent-roll. How many landlords realize any such ideal to any adequate extent? There is still too much truth left in the old assertion which Professor Robertson once more repeats that, while the producers of other articles of common consumption have adjusted their methods to new and changed conditions, the farmers in Britain, and Canada as well, have in too many instances stuck to the old style of farming, which was adapted to the conditions of market and life forty years ago, the inevitable outcome being financial embarrassment if not utter loss of capital and heart. It must, of course, be admitted that the ordinary conditions of agricultural work are not favourable to hasty changes. If new and better methods are to the found, here is the landlord's opportunity for leading the way. Professor Robertson makes a strong point as to the advisability of so extending our legislation as to insist upon a clear and unmistakeable means of designating to the ultimate consumer the source whence all the animal products offered for sale have originally come. He urges that the English, the Irish, the Scotch, and the Canadian farmer have all had to meet the unfair competition of counterfeits, in substance and in name, which, by their low price per pound, have turned the consumption from more wholesome, nourishing, and, on the whole, cheaper honest

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products. It is the competition of these "counterfeits" which, in his view, is most to be feared by the British farmer. The law has already done something to ensure that the consumer shall know, for instance, whether it is butter or margarine that he is buying; but Professor Robertson would have us go further still in this direction, and he suggests that the colouring of any fatty substance into an imitation of butter should be prohibited. Whether such prohibition would be considered justifiable is, perhaps, a debatable question, but there should be no objection to the clear designation of every article sold, whether foreign meat, butter, cheese, or any other food-product. Professor Robertson draws attention to the effect of the quality of the foods produced in these northern climes on the constitution, vitality, and vigour of the race. He evinces some of the patriotic partiality and the dry humour of his nationality—for he is a true Scot—in the observation that "the difference between a Scotchman—the finished product, in a material sense, of oatmeal and the Shorter Catechism—and a hundred Chinamen, the embodiment of rice and the Confucius confusion, is evident to all students of the material sources of race energy." Professor Robertson apparently believes that the whole race, as well as the agricultural interest, might be benefited by an extension and thorough application of the Merchandise Marks Act.

(3.) *From "The Daily Post" Liverpool, December 21st*, 1892.

## THE FOOD-PRODUCING RESOURCES OF CANADA.

### HOW THEY CAN BE DEVELOPED.

*Address by Professor J. W. Robertson in Liverpool.*

Yesterday, at the Liverpool Produce Exchange, Victoria Street, Professor J. W. Robertson, Dairy Commissioner of the Dominion of Canada, and Agriculturist of the Government Experimental Farms, addressed a meeting of the Liverpool Provision Trade Association on "The food-producing resources of Canada, and how they can be developed to the mutual advantage of the Liverpool merchants and the Canadian producers." The attendance was numerous.

Mr. John Marquis presided, and, in introducing Professor Robertson, said there were two special reasons for the development of Canadian resources. In the first place, Canada was one of our own colonies (hear, hear, and applause), and since this country must import a large proportion of its food supplies, it was preferable that the money should go to subjects of the Queen. In the next place, trade development would add to the attractiveness of Canada as a settlement, and the Association, in hearing Professor Robertson, was pursuing a course at once profitable and patriotic.

Professor Robertson in his address said:—I am glad to have this opportunity of meeting in conference with the leading and representative men of the provision trade of this great city. My mission to England is perhaps more to learn than to teach. Still, I am willing and desirous to communicate information to such bodies as your own concerning the vast resources of our young colony, and how they can be developed to furnish food for the teeming millions of your industrial centres. You will recognize that there is an intimate interdependence of interests between the producers of food and those who are engaged in its distribution to the ultimate consumers. Perhaps some of the wealthy men to whom Liverpool owes much of its commercial prosperity, fail or forget to remember the sources from which that prosperity is drawn. The vast warehouses which line your business streets, the extensive docks which present such scenes of bustling activity, owe their existence largely to the handling of large quantities of farm products.

### THE CAPABILITIES OF CANADA.

The object of all farming is to create wealth, in food and clothing. Wheat, cheese, bacon, butter, and cotton are all products of some farmer's toil and skill.

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If these can be multiplied in quantity and increased in value, every handler of the same, every business man, will have a better chance to enlarge his transactions and to increase his profits. Canada has vast areas of arable and pasture lands which are not yet occupied. It contains some three and a half millions of square miles—in fact, the whole of Europe is less than one-twelfth larger than the Dominion of Canada. It has a land surface nearly twenty-nine times larger than the combined areas of Great Britain and Ireland. As yet there are only some twenty-five millions of acres under cultivation, and about sixteen and a-half millions of these bear a cultivated crop every year. Indeed, no five millions of people on the face of the globe in a national capacity are possessed of natural resources and sources of wealth in an equal degree with the people of Canada.

### THE CANADIAN GOVERNMENT AND AGRICULTURE.

The Government of the Dominion of Canada has recognized that it can help the farmers with the highest efficiency by assisting them to reduce the cost of production and to improve the quality of their products. A few years ago they established a system of Experimental Farms with headquarters at Ottawa. In the widely separated provinces, from Nova Scotia on the Atlantic coast to British Columbia on the slopes of the Pacific Ocean, Experimental Farms have been located and equipped. The primary object of these farms is to investigate the varieties of grain which are best adapted to different soils, climatic conditions, and methods of cultivation. When information has been obtained from experiments, bulletins and reports are distributed widely for the guidance of the individual farmers in their own practice. The work of these Experimental Farms is intended also to stimulate farmers to a more careful study of the principles which underlie successful management of their own business. Already they shed the kindly light of reliable and helpful information into the homes of the poorest, as well as into the lives of their wealthier and more favoured brethren. The official and authoritative nature of the information which is given makes it so much more acceptable and available for use by the average farmer. As an instance of the far-reaching influence of this work, it might be mentioned that last year over 15,000 sample bags of new and promising varieties of grain were distributed free. From the sowing of the contents of these sample bags upon well-prepared soil many farmers were able to obtain from the first crop as much as two bushels of a new and valuable variety of grain, at no cost to themselves. The quickened interest with which the growth of these varieties was watched has had a most wholesome and stimulating influence towards improved methods of grain cultivation. A farmer observes the growing of these new varieties with such thoughtful care that generally he becomes a man practically educated in the best way of cultivating soil and growing cereals. In Canada, more than in any other part of the world to-day, the farmer has a splendid opportunity of governing the quality of the products of his lands and hands, according to the direction of his mind.

### CANADIAN DAIRY PRODUCTS.

Besides the work on the Experimental Farms proper, Experimental Dairy Stations have been established in each of the provinces which lie east of Manitoba. These are becoming centres of exact and authoritative information on the best methods of manufacturing cheese and butter. The products from them are shipped to these markets, mainly through Liverpool, to gain information from close market contact how to meet the preference and prejudices of British merchants and consumers. Through these we are trying to help farmers by showing them how to seek the market, how to suit it, and how to keep it for their own goods. The British farmers have least cause to fear the competition of Canadian food products. A fancy Canadian cheese, which pound for pound is equal to the finest English Cheddar, tends to create a more general and active demand for good cheese. You yourselves know that it is the inferior quality of the perishable food products which tends to glut and depress the market, as well as to bring prices to a ruinously low point. In Canada we are

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also conducting experiments to discover how we may obtain food products of animal origin of the most wholesome and toothsome quality at the lowest possible cost. It is a delusion to suppose that the crude, bulky, and primitive products of agriculture in the form of grains or hay crops can be exported indefinitely, or that the trade in these can be made profitable to the country which exports them. They take too much out of the soil. Canada is the natural home of cattle. With its fertile soil and bracing climate, it gives vigorous health to domestic animals and freedom from all serious diseases of an infectious or contagious nature. If by some indefinable, supernatural, or subnatural agency the dreaded disease of pleuro-pneumonia was found in cattle which came from Canada during the present year, is was quite certain that is was acquired after they reached these shores, because the disease is wholly unknown in Canadian herds.

### THE CATTLE AND HOG TRADES.

We have conducted extensive experiments in the fattening of steers, and have been able to show the Canadian farmers that by the growth of Indian corn fodder and the making of ensilage from the same they are able to produce beef of the most excellent and luscious flavour and quality at a reduced cost to themselves. The cost of feed consumed in the case of calf-steers was rather less than 2½d. per pound of increase in live weight; while the cost of feed consumed in the case of two year old steers was rather less than 3¾d. per lb. increase. Of the £13,000,000 worth of cattle and beef which are imported into England from outside countries, Canada expects to send a much larger share in coming years, and when consumers acquire the habit of asking for Canadian beef and seeing that they get it, trade may be more profitable to producers, importers, and butchers alike. It may be of interest also to you to learn a few facts that have been discovered from our experiments in the fattening of swine. England imports bacon, hams, and pork to the value of over £10,000,000 annually. Canada has come into this market also to increase her output, and to please the British public with the quality of her bacon and hams. Feeding experiments, in which pigs of similar breeding and age were in one case fattened exclusively upon Indian corn, and in another case upon mixed grains and by-products from the dairies, have demonstrated the great superiority of the bacon from the feeding of mixed grains and skim milk, buttermilk, or whey. That is how the pigs in Canada are mainly fed. Our experiments have also brought to light the fact that 15lbs. of increase in the live weight of swine can be obtained per bushel of inferior wheat which has been fed. At this juncture, when there is a great outcry in England about the low prices of wheat, it occurs to me that the English farmer, with the best of wheat at 26s. to 28s. per quarter, might turn it into fresh pork with advantage to himself and the consumers, who would thus obtain a quality of lean and nutritious flesh much superior to the lardy bacons which come from foreign countries, where Indian corn is the staple and almost only food. On the Experimental Farm at Ottawa we have an extensive poultry department. Our trade with England in the exportation of eggs and poultry is a growing one, and it should be capable of great extensions, as I find that you imported of these two items to the value of £3,962,501 last year. Let me offer you a few brief remarks open the food-producing resources of Canada by provinces.

### CO-OPERATIVE CHEESE AND BUTTER FACTORIES.

Prince Edward Island has a size of about 2,000 square miles. Its population is comparatively dense for Canada, although it reaches only 54·5 persons, per square mile. It is now beginning an export trade with Great Britain in cheese and eggs, and this will doubtless be followed in a few years with butter and bacon. It is a most beautiful and fertile province, and bears the well-deserved title of the Garden of the Gulf of St. Lawrence. There is a very small percentage of waste or unreclaimable land in it. The Dominion Government have established an Experimental Dairy Station at New Perth, and the product from that station is expected at this

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port sometime during the present week. The Island is capable of supporting at least fifty large co-operative cheese and butter factories, the product of which will ultimately find its way into this market. The comparatively cool climate in summer gives the farmers very exceptional advantages in manufacturing the finest quality of both. Nova Scotia, like old Scotia, has a most diversified surface aspect. You can see there the majestic beauty of rugged mountains joined in happy union to fertile valleys. The Annapolis Valley is really a stretch of over fifty miles of orchards whence come the high flavoured and brilliantly coloured apples which are so much approciated in this country. I am informed on this side that the apple trade with Canada is a satisfactory one, inasmuch as, unlike the manner of carrying it on in other countries, the small ones are found on the top of the barrels. There is a branch Experimental Farm at Nappan in Nova Scotia, where similar work is carried on to that which is conducted at the Central Experimental Farm at Ottawa.

### CONDENSED MILK.

In this province there are condensed milk factories. From these we hope to send quantities of this wholesome food, for which the demand seems to be increasing. In the Antigonish Valley, the county of the present Premier, Sir John Thompson, there are numbers of cheese-factories, which are being enlarged and increased in number every year. Products from these provinces will soon find their way here in larger quantities. The province of New Brunswick is best known in England as a lumber-producing district. However, it has large stretches of arable and fertile soil. Dairying, the cattle industry, and fruit growing are being extended on all sides. The Dominion Government have established an Experimental Dairy Station, and the butter from it has gone to London, where it has met with a favourable reception. The provincial government of New Brunswick last year made a grant of £2,000 to promote the extension of the dairy industry, and to support travelling dairies, which have gone to all sections, giving illustrations and instruction on the best methods of making butter. We have found the farmers in these Maritime Provinces most susceptible to educational and instructive influences. Some of them may be ashamed to be ignorant of the best farming methods, but they are no longer hostile to the educational opportunities which the government has afforded them. The silver medal and second prize for the finest cheese at the Royal Liverpool, Manchester, and Lancashire Exhibition during the present season went to a New Brunswick factory.

### COLONIAL OPTIMISM.

Quebec is a province whose inhabitants are people full of hope, courage, and optimism. They are by far the greatest optimists on a continent where pessimism is an unthrifty exotic, which the brilliancy of Canadian skies and the exhilarating dryness of Canadian air relegates to the crypts of whisky livers, tobacco hearts, disgruntled professors, or disappointed politicians (laughter). The people are becoming most wisely enthusiastic about their own work. Educational agencies for the benefit of the farmers and the development of the food-producing resources of the province are being promoted by both the Federal and Provincial Governments. Very great improvements in the quality of the cheese from these provinces have been effected during the past few years. Many cheese factories and butter factories now turn out a quality of product quite as good as the best from those in Ontario. I have been surprised to observe that a committee of the Bristol Provision Trade Association have accepted a resolution which reflects upon the quality of the cheese from a particular district in Quebec. Cheeses from the French district of Quebec are now made in large quantities, in syndicates of cheese factories which are under the supervision of competent instructors and inspectors. They are not at all what they were a few years ago. The sweet grasses, pure spring water, cool nights, cattle of excellent breed, and people of enterprise, all promise a very rapid extension of the trade between Quebec and Liverpool in a high class of food-products.



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I have already referred at considerable length to the work of the Dominion Experimental Farm which is situated in Ontario. There is another experimental farm at Guelph, Ontario, maintained by the Provincial Government. It also is doing admirable work in the interests of the farmers of the province. We have a Dominion Experimental Dairy Station at Perth, in the county of Lanark, where we made during the month of September the mammoth cheese of the world, which is to be exhibited at the Great Columbian Exposition at Chicago next year. It weighs over 22,000 pounds net, and will doubtless find its way to or through Liverpool before it is cut up and consumed. (Laughter and applause.) It is most excellent in flavour and solid in body throughout. We put no wooden hearts in our cheeses. (Laughter.) In Ontario there are now over 800 co-operative cheese factories, and the products from these are sometimes known at this market as "Brockvilles," "Bellevilles," "Napanees," and "Ingersolls." As a matter of fact, the method of making Cheddar cheese throughout Ontario is now almost uniform in all the districts, and while "Ingersolls" are widely known and deservedly held in high repute, they no longer have to struggle against the influence of inferior cheese from other districts.

### "MATERIALIZED SUNSHINE" *versus* MARGARINE.

Winter dairying for the manufacturing of fancy creamery butter has now been well commenced. During last winter two Experimental Dairy Stations were established and controlled by the Government. From their influence, and in the information which they were able to disseminate, eighteen co-operative creameries in Ontario and fifty in Quebec are now in operation where none were last year. We have designed an attractive, strong, neat package, to be known as the "Canadian tub," and in it buyers may depend upon receiving only uniformly fine butter, free from all suspicion of adulteration. There is not much difference in appearance between butter and margarine, but there is a tremendous difference upon those who have delicate organs of digestion. In butter is contained energy which is most easily transformed into vital force. More than any other food it merits the name of "materialized sunshine." By furnishing large supplies of this excellent food the cows are becoming most profitable citizens in our country. The purity of flavour and substance of the dairy products of Canada is due to the cleanly habits of the people. Right over the continent a Canadian woman's abhorrence of dirt is proverbial. If the great mass of consumers in England but knew the real difference between pure and fine butter and the conglomeration of fat labelled "Margarine" which looks pretty in your shop windows, they would have no hesitation in deciding which to buy. In these days, when the microbes of disease are fearfully insidious and destructive, it becomes the people to choose for eating only food which is prepared in countries where the home habits of the people are scrupulously clean. Mixed farming mainly is followed in Ontario, and with the many sources of revenue which it provides, the people there have every chance to do well. Our effort is directed towards inducing the farmers to increase their output of those food-products which are concentrated in quality and in value. It pays thus to reduce the percentage of value which is absorbed by transportation charges.

### MANITOBA AND THE NORTH-WEST TERRITORIES.

Wheat has been the main product which has been exported as yet from that part of Canada. The great area there which was the native home of the buffalo, whose bones are found in great quantities and made into charcoal, shall yet be the home of the ox, for the furnishing of beef to the dense population of England. The fattening of swine is also becoming more general in that part of Canada, and packing houses will doubtless arise on the banks of the Red River and the Assiniboine, on a smaller scale, but of a similar nature to those which have made Chicago a city almost twice the size of Liverpool in less than half a century. At the Experimental Farm an effort is being made by the crossing of different varieties of wheat and other grains to introduce the early ripening qualities of some sorts which have been

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obtained from Northern Russia and India, into the productive and hardy qualities of other varieties which have been originated or have to be acclimatised in Canada. By these means farming will be rendered more profitable, and by the growth of trees which have been distributed free, to the number of several hundreds of thousands, the conditions of life of these vast plains will be ameliorated and rendered more pleasurable to farmers and their families.

### THE WESTERN PROVINCE.

On the other side of the Rocky Mountains we have a branch Experimental Farm at Agassiz. There we are paying particular attention to the investigation of the varieties of fruits which are best adapted for culture in that climate. The temperate climate of the Western Province and the fertile soil of its valleys make it a perfect paradise for the growth of most sorts of trees which are useful for fruit or valuable for their timber. To put it in the form of the American habit of grotesquely humourous descriptions, some of the trees there are so tall that it takes two men to see to the top of one of them. Without either humour or exaggeration, I may mention that I have seen crops of hay taken from the meadows on the Fraser river valley which yielded four tons to the acre, and crops of oats which produced 120 bushels per acre. Of course these are most exceptional cases, but still they give evidence of the food-producing capacities of that part of Canada. Besides the fruits, grains, and roots which can be grown there, there is an almost inexhaustible supply of food in the salmon fisheries. The same is true of the coasts on the Atlantic side of Canada.

### AGRICULTURAL ORGANIZATION.

From what I have said, it will be evident to your minds that the plan which the Government of Canada has adopted for helping the farmer is one which gives him aid chiefly at the home end of his business, where the profits in most enterprises are mainly made. Upon all the experiments which are conducted reports are made from time to time when they have been carried to a sufficient degree of completion to afford safe guidance for the farmers in their home practice. Then Farmers' Institutes have been organized in all the provinces, which provide for systematic and regular meetings of their members to discuss matters of common interest to all relating to their own business. These conferences of meetings help to clear away mists which gather round men's judgments when their information is imperfect or incorrect, and lead to the adoption of the best practices. Co-operation of the heartiest and best sort is induced, whereby the farmers are enabled to reduce the cost to themselves of carrying on their business.

In this educational work on behalf of the farmers we are deeply indebted to the newspapers of Canada, to the editors of which much credit is due for the public-spirited assistance which they have given in attracting the attention of farmers to the possible benefits which would accrue to themselves and all other industrial, commercial, and professional interests from the adoption of the best methods of farming. Those highest in station in the whole land have given invaluable aid to this forward educational movement. By his active and frequently manifested interest in the welfare of the farmers, the Governor General, His Excellency, Lord Stanley of Preston, is recognized as a statesman whom the farmers of Canada have learned to look upon with great respect and admiration. It was their happiness not to have a nobleman who plays the fiddle of social or political jugglery to amaze and amuse the common people, but a worthy representative of Her Majesty—the leading farmer in Great Britain—who lost no opportunity in cheering the hearts of the sturdy self-reliant yeomen of Canada with words of sound advice and good counsel. (Applause.) Through all these agents and agencies to which I have alluded, it may be seen that Canada is a most valuable part of Greater Britain, possessing enormous resources for the products of the best food for the millions of the industrial centres of Great Britain. Of the opportunities for a larger development of trade in these commodities to which I have referred—cattle, beef, pork, bacon, hams, cheese, and butter



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—I have but to instance the fact that Great Britain at present imports about £40,000,000 annually. Canada should, and could send them a much larger share of these than she has done in time past. (Applause.) I am confident that the English market is able and willing to give such prices for excellent produce as to leave a living profit, leisure for workers, and enough of a balance to make Canadians the most prosperous and contented farmers in the world. (Applause.)

Mr. S. G. Sinclair proposed a vote of thanks to Professor Robertson, who had given them a great deal of information and afforded them a great deal of pleasure. They all knew that Canada was a large country, and was steadily growing, and they would feel not only that they now knew more about the Dominion, but also that now they thought it a greater country than they did before. Professor Robertson appeared to be under the impression that the rich merchants of Liverpool had been making tremendous profits out of the poor Canadian farmer. The fact of the matter was that they had been working very hard to help the Canadian farmer, and getting next to nothing for doing it. He hoped that in the future they would be able to do better for the farmer and for themselves. (Applause.)

Mr. J. V. Hodgson seconded.

Mr. W. Marples observed that while the import of Canadian cheese into the United Kingdom was during the last twelve months 300,000 boxes larger that in the twelve months preceding, the import into Liverpool had decreased. The reason was that Canadian cheese was hard, well salted, and close pressed, whilst the markets which Liverpool served required a white, soft, mealy cheese, such as came from Quebec. A large trade was now done, but the trade might be much larger were more of the Canadian cheese like that produced in Quebec. As regarded butter, whilst some years ago Liverpool firms received large quantities of butter from Canada, of recent years they had received practically nothing. He suggested that Canadian fresh butter should be packed in air-tight whitewood firkins of about 100 pounds and that tubs, which were a poor package and liable to be broken, should be disused. Packages from America might with advantage be bagged, in order to present a bright, clean appearance. A parcel of Canadian butter packed as he suggested had during the week sold for 120s. the highest price made for some time.

Mr. B. McGranahan said that they had heard a great deal of what they should do for Canada, but he would suggest that they might ask what Canada was doing for them. If the Canadian Government was able to allow British products to go into Canada duty free, then they might in this country be able to guarantee the formation of a league to sell nothing but Canadian produce. (Laughter and applause.) They certainly in Canada did not institute a McKinley tariff as in the United States.

The vote of thanks having been passed, Professor Robertson, in reply said he thought that they in Canada would be able to meet the demands of the English consumers, retailers, and wholesale importers in the kind of cheese they wanted. They would also try to meet their views in the way of packing butter.

A vote of thanks to the chairman was passed at the close of the meeting.

(4.) *From "The Scotsman," Edinburgh, 21st December*, 1892.

The agricultural problem may not unfairly lay claim to be the question of the day. It may be hoped that when it has had its day of concentrated public attention, a practical solution of some of its perplexities may have been devised. Some of the heroic remedies of which much was heard in the recent Agricultural Conference are rapidly drifting out of the public regard. Their advocates may be expected for some time to occasionally distract attention from more useful proposals, by pressing them on the notice of the agricultural community. But that is all. As an aid to the thoughtful study of the situation that is going on throughout the country, attention is directed in another column to some facts, of which many may not be aware, relating to the progress of agricultural science in Canada. The circumstances of the Dominion are not in all respects comparable with those which rule in Great Britain. Canada, too, however, has had its agricultural problem, for a fall in the prices of produce such as has been experienced could not fail to disturb

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economic conditions. The cultivation of the soil, the rearing of fruit crops, and the raising of farm stock is the national industry of Canada in a sense which does not apply in Great Britain; and on this account the Dominion Government has taken the agricultural interest under its special care and protection. Its task has been to instruct it in the science of taking care of and protecting itself. It is little over two years since the matter was taken in hand on a scale of any magnitude; but the scheme has been attended with a degree of success that, to say the least, is phenomenal, and its results cannot fail to materially affect the prosperity of the whole country. Under the administration of the Minister of Agriculture a Central Experimental Farm has been established in Ottawa. It has been placed under the management of skilful men, capable not only of collating the results of valuable experiments in all departments of farm work, but of presenting them in the form of popularly written reports, and, what is of equal value, instructive lectures to farmers throughout the Dominion. Branch farms in other parts of the country have also been established in order that the experiments might be carried on under diverse conditions as to soil and climate.

The distribution of small sample bags of grain or seed to all farmers who may apply for them is one of the most valuable features of the work at these farms. A large part of their area is set apart for the growing of crops of the most suitable kind, with a view to discovering those which are best adapted to particular soils. Of very great importance, also, is the series of experiments made in the feeding of cattle and swine. There are probably few farmers anywhere to whom the knowledge acquired from these experiments would not be of instruction and value. The first place, however, in the great educational scheme of the Canadian Minister of Agriculture is the work carried on by the Dairy Commissioner, Professor J. W. Robertson, to whose second annual report attention is directed. The exhaustive experiments conducted at the Central Farm are really of secondary importance to the work that he and his staff of assistants have overtaken. They have, it may be said, been over the length and breadth of the land, delivering popular lectures and giving demonstrations in the work of cheese and butter making. They have temporarily taken over for their department a large number of cheese factories for the winter, fitted them with the necessary apparatus and turned them into working creameries, in order to demonstrate the commercial soundness of a scheme that must have been regarded with considerable misgiving. On such a scale has this work been carried on, that it may be accepted as literally true that there are few cheese or butter makers in the entire Dominion who have not witnessed or come into direct acquaintance with the most approved methods known in their industry. The best systems of cattle feeding, swine feeding, the preservation of fodder in silos have been brought under the notice of every farmer in the country, either by means of a lecture or through the medium of the bulletins issued from time to time from the Experimental Farms and Agricultural Colleges. In its several departments this great educative scheme has manifestly made an impression on the people for whose benefit it has been planned. A distinct step in advance has been made, and it need hardly be added that those who fail to keep pace with that advance will fall behind in the race for wealth and the struggle for subsistence.

It must be left for those whom it directly concerns to consider how the facts thus briefly noticed are likely to affect British agricultural interests, and also whether they have or have not an instructive aspect. Our imports of agricultural, dairy, and farmyard produce show no signs of diminution. It has occurred to many observers that the heavy arrivals of butter, cheese, and eggs from abroad that find a place on our produce markets are an unnecessarily severe inroad upon the domain of British farmers. Various and apparently satisfactory reasons have been given for not altering the economy of the farm to combat this foreign competition. So far as Canada is concerned, that competition is likely to become keener. The standard of quality is distinctly raised, and that may be held to mean the shouldering aside of inferior produce, from whatever quarter it may come. These matters enforce their own lesson, but it is desirable that it should be learned at as little expense as possible. It may be that the time has arrived when a readjustment of farming industry has

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become expedient; for competition in cereals has reduced the returns in that department to a very narrow limit. Competition, however, is to be confronted in every branch of farming, and it goes without saying that the prize is to the skilful and economical administrator of the materials and means that he has to employ. If there be any lesson to be learned from what is going on in Canada, it assuredly lies on the surface. It is for farmers themselves to decide whether any portion of it is worthy of being put in practice. They also are the best judges of the method by which any scheme of the kind to which attention is drawn may be set in operation. Whether it be necessary, desirable, or praticable in this country, differently circumstanced in many respects as compared with Canada, is a matter for thoughtful consideration; but it will not be denied that it relates to one aspect of the agricultural problem which it would be the depth of unwisdom to disregard.

(5) *From "The Grocers' Gazette," London, England, December* 24, 1892.

## FOOD PRODUCTION IN CANADA.

### Professor Robertson at the Home and Foreign Produce Exchange.

An unusually large gathering assembled on Wednesday afternoon at the Home and Foreign Produce Exchange, Hibernia-chambers, London Bridge, S.E., to hear an address by Professor J. W. Robertson, Dairy Commissioner of the Dominion of Canada, on "The Food Producing Resources of Canada." Mr. J. D. Copeman (Chairman of the Exchange), presided.

The Chairman, in introducing Professor Robertson, said he felt quite sure, from what he heard that gentleman had done in other parts of the country, that they would have a most interesting lecture. It was a happy idea of them to welcome any gentleman representing such a large interest as that which in Canada was connected with their particular business, and it was a very happy thing that they should show the right hand of fellowship to all connected with the provision trade in the great Dominion, which was one of the largest appendages, if they might so call it, of the British Crown. (Hear, hear.) After Professor Robertson had made his remarks, he would be very glad to have any suggestions from them as to what would be beneficial in regard to the mode of shipping goods, or any important facts they might be able to bring to his notice. He thought Professor Robertson would be able to give them a great deal of information, and hoped in return they would give him some to take home with him for the mutual benefit of Canadians and themselves. (Applause.)

Professor Robertson then rose to deliver his lecture, which he illustrated from time to time by reference to a large map of Canada hung on the wall behind him. He said he was very glad to have the chance of speaking to the members of that Exchange as to the food-producing resources of Canada. He came to this country far more to learn than to try to teach them, but he was glad to have the chance of communicating to them something about what was being done in Canada to help to make better and more palatable food for this country. They had in Canada to-day the duty of producing much of the wealth of the world, so far as food and clothing were concerned, whilst the merchants of London and other great commercial centres had to distribute their products and thus the interests of the two parties were identical, and they were dependent on each other for much of their success. (Hear, hear.) The men who produced the world's wealth, he was sorry to say, had very little chance of retaining it, whilst his hearers, who distributed it, had a very large share—(laughter)—and he hoped the rich merchants to whom he was speaking would give the poor Canadians an idea how to retain more for themselves, even if they became rather poorer in consequence. (Laughter.) The object of all farming was to produce wealth in food or clothing. Wheat, and cheese, and butter, and pork, and cotton, and wool, and silk—all those goods from which the greatness of London arose—were in one way or another the produce of the farm. In every part of its business the great city in which he stood was dependent on the land; even

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the silk necktie he wore came from a plant, being raised from the caterpillar on the mulberry leaf. Their business in Canada was to create wealth, the business of the London merchant to acquire it. Canada had a very large area of undeveloped land and therefore vast resources. The whole of Europe, including this island, was just one-twelfth larger than Canada, which contained 3½ million square miles, and comprised enough land to make 29 countries as big as Great Britain and Ireland. By-and-by, when England sent more of her good men to them, they would fill up the great expanse of fertile soil shown on the map before them, and send food over in vastly greater quantities, receiving clothing and other goods in return. (Hear, hear.) They occupied 25 million acres at present, of which 16½ millions bore a cultivated crop every year. There were no five million people in the world who in a national capacity owned so much of what produced wealth—in soil, and water, and sunshine, and minerals, and the intelligent labour of the people. Well, the aim of all farming was

TO MAKE MONEY—TO MAKE PROFIT.

He was aware that in London they had a few people who had no such aim, and who came from a very little part of the island called Scotland. (Laughter.) Those people had no such aim as money making, so far as he could learn, but lived simply to give good advice and benefit their fellowmen, and they had been giving some very good advice to the Government of Canada. That advice was that instead of bamboozling the people with politics the Government should teach them to produce cheaper and better food, and so to send more out of the country and get more in return. (Hear, hear.) So the object of the Canadian Government was to help the common farmer to improve his produce, and so to increase his profit. They had a system of experimental farming extending all over the country, and having its headquarters at Ottawa, and farms extending from Nova Scotia to the Pacific. This system had a far-reaching influence on the butter and cheese and other products that were sent over to this country. Its primary object was to improve the corn growing of the people, and so to improve also the produce raised from corn. Last year 15,000 sample bags of the most promising varieties of grain were distributed to farmers in different parts of the Dominion. Each of these sample bags, sown in a suitable soil, would bring in return to the farmer two bushels of a new variety of grain better adapted to his land than that previously used. The farmer had in many cases fallen into ruts and was unwilling to adapt himself to new conditions. But when he had a present made him of this sample bag of grain he planted it carefully and watched over it and talked about it day after day until in one season he learned more about grain cultivation than he could have acquired in ten years from books. Thus he became practically educated in the cultivation of cereals, and economical production of grain lay at the root of production of all other foods. Whilst they were trying to help the farmer to reduce the cost of what he sold, they did not want the price he received to be reduced. (Laughter.) If he could reduce the cost of his productions, and at the same time make them more excellent, he did not require to reduce the price. (Hear, hear.) If he reduced the cost he got a profit at the safe end of his business, and if the price went up he got another profit on the top of that. No country could produce food so cheaply as Canada. They had been growing Indian corn for ensilage, and it cost them less than 6s. 6d. a ton in the silo, ready for feeding the cattle. They wanted to produce better, and at the same time to get more profit for themselves. To show the range and extent of the work of the Government farming system, he might say that last year they tested 420 varieties of grain, 135 of potatoes, 53 of field roots, and 624 of large fruits. They tried to

GET BETTER APPLES—APPLES THAT WOULD KEEP

better and have a better flavour and appearance than those sent over hitherto, and he was glad to find that the Canadian apple trade was very satisfactory. One Manchester man said to him—and he could see that he meant what he said—that the Canadians always put the small apples at the top of the barrel. (Laughter.) Of

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the smaller fruits 423 varieties had been tested, and of vegetables 293. This shower the scope of their work, showed how they were trying to touch the life of the farmed at every point, and to enable him to produce more at less cost to himself. Besides this, they had Experimental Dairy Stations, which touched the trade of those to whom he was speaking perhaps somewhat more closely than some of the work he had described. They sent dairy produce over to London, and also to Liverpool and Glasgow. Some Canadian produce was received in London the other day, and he would hardly like to tell them the price it was sold at, for it was a little more than the very top quotation at that Exchange. They hoped in Canada to make all the various articles of their produce better than the best that came over at present. Not only were they helping the farmer to produce, but they helped him in seeking the market he could serve best, and helped him to serve that market by suiting it. Once when he was very young he was foolish enough to believe he could educate the English eater to like something which he ought to like, but he had quitted thinking that for a long time, and now he simply wanted to know what the eater liked, leaving the education of his tastes to some one with a century or two of leisure. (Laughter.) He wanted to know what the English liked, so as to go home and tell his people. In the Dominion people were very teachable and wide-awake, and eager to hear from all quarters. They had not "book" farmers in Canada, but men who were anxious to acquire information, and to put it into practice. He had been in Liverpool during the week, trying to get them to give higher prices for Canadian produce than London. That was the sort of competition he liked, the competition to get the produce, but the competition that affected them most was that of the products themselves. He found he could not get Liverpool men

TO GIVE ANY BETTER PRICES THAN LONDON,

not that there was any ring—he did not think such a thing for a moment, but simply that neither town would pay for an article more than it was worth. But they were all most willing to pay for better quality, and quick in appreciating it, and that suited Canada. He would like the prices for inferior goods to go right away down to zero, and those for the best to go up. It did not cost any more to produce good stuff than bad, and Canadian farmers should be taught to feel the loss of producing bad. The farmer in England had less to fear from Canada than from anywhere else. They knew that wherever they had a fine cheese people eat more of it, and the same with fine butter. So Canada by sending the finest produce could help the English farmer, but the poor stuff that was imported from different parts had the effect, by its inferior quality, of reducing the consumption and so depressing the price. Canada wanted to help the English farmer by improving produce, and so increasing the consumption and raising prices. They had been trying experiments as to the best way of raising animal products from corn, because no country could continue long to ship away primitive products like corn and hay and to make it pay. It took the very heart out of the soil, and they could not get it back, but if they fed cattle and kept the manure they kept the fertility of the land. They would send these products only by-and-by, and not the crude materials in the form of corn. Canada was naturally perfectly adapted for keeping cattle healthy. They had no disease among their cattle that was serious or dangerous. It was said some steers from Canada had pleuro-pneumonia when sold here, but if by any supernatural or sub-natural agency these animals got that disease it was after they came, because there was no disease like it over the whole of Canada, and never had been. They could depend on Canadian beef, and bacon, and cheese and butter being wholesome right through, because the animals were healthy and had no disease that they need dread. Canada was ambitious to have a good name in this respect. They were not an old people. Was there ever a boy of twenty (men they were called now)—(laughter)—who had not pretty high ideals and would keep trying every Monday morning to act up to them, but by the time he was 40 he would be quite willing to relinquish his ideals in deference to other people, and to do things he would have scorned to do when young. So Canada, which was still young, had its ideals like the young man, and the Government had prohibited the making of

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ANYTHING THAT WAS ADULTERATED,

or that was in any way an imitation of some genuine article. (Applause.) Laws to that effect were on the Dominion statute-book to-day. (Hear, hear.) By the use of suitable foods beef could be produced at wonderfully low prices in Canada, the cost of food being only from 2½d. to 3¾d. per pound increase in weight in the animals. But they had no intention of selling those pounds if they could help it for less than 6½d. each. (Laughter.) They tried to reduce the cost to the producer, but to make the quality better, and then there was a margin of profit to be divided between him and the distributor in this country. A sum of £13,000,000 was annually expended by England for imported cattle, and of this Canada expected to get a much larger share in the future. The Canadian Government had been carrying out a number of experiments with regard to the fattening of swine. England purchased ham, bacon and pork to the value of £10,000,000 a year; and some London firms were establishing curing-houses in Canada. Thus Canada was increasing her output of this product, and intended by the quality of her goods to secure a large share of English custom. Some people had an idea that the feeding of swine was hardly as respectable as other occupations. (Laughter.) He did not quite know how this idea originated. Perhaps the scriptures had something to do with it. (Laughter.) At times, when he had referred to the subject, persons had laughed and said something about the prodigal boy. But that boy, who was very uneconomical and hot-headed, never began to re-establish his financial or social position till he had taken to feeding swine. (Laughter.) To show the growth of the Canadian bacon industry, the speaker said that one of the largest packers in that country had assured him that last year he was only able to pack 40,000 swine in twelve months, but this year in six months he had packed 60,000. (Hear, hear.) The business was, in fact, growing rapidly, and the production of swine was capable of being indefinitely expanded by the farmers of the Dominion. He would give one more instance, which might be useful to farmers and other business men. London was a great corn centre—here, he noticed, they called all cereals corn. They had been making experiments in the feeding of swine with grain, and it had been found that, even with inferior wheat, every bushel used would give 15 pound increase in the live weight of the animal. He did not see why in England they should let good wheat go at 26s. or 28s. a qr., when it could be turned into pork in this way. He would never think of selling wheat at less than 40s. a qr. when they could get such high prices for pork. Not only that, but the pork fed in this way was of a far better quality. It was far more luscious and lean than any other bacon. In the West, before very long, Canada would be feeding large quantities of swine and cattle, and

SENDING MUCH BETTER BACON HERE

than that which had in the past been forwarded from Chicago. Before leaving the subject he would like to give just one more instance, with regard to the sale of poultry. The English people were full of good living—one could see it in their faces, and hear it at every hotel. (Laughter.) For a people of so much intellectual ability he never knew so much time taken up in discussing what they had to eat. He saw some fine turkeys the day before in Liverpool, as fresh and sweet and nice as possible. They came from Canada, and the man who bought them paid what he thought they were worth, but on a very small lot he made £600 profit. He wanted 9d. a pound for them, but he had only given 5d. Really, half the profit would be enough to recompense the capital and risk involved, and then there would be a better return for the producer. Proceeding to deal more particularly with Canada itself, the speaker first referred to Prince Edward Island, which had 2,000 square miles of land. London had got practically nothing from the Island in the past, but there was a shipment of cheese coming that should fetch 57s. in the market this week. It was as fine as any cheese he had ever shipped from Ontario, the cheese from which province were like the finest Scotch cheddars, but with more butter in them. (Laughter.) Farmers there had now commenced to grow Indian corn as

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fodder. They used to laugh at him when he advised them to do this, and tell him it would not grow. He said, "I will give you a little bag—just enough to plant a quarter of an acre, for nothing—at the Government expense." Now to get something for nothing always tickled a man. (Laughter.) Last year he again visited the district, and there were 2,000 acres of the corn growing, which would feed as cheaply as hay at 15s. a ton. The year before only ten acres were grown. A great quantity of cheese was being sent out of the Island already. It would be worth the while of some London dealers to get an agent out there to buy produce on the spot. That little island was capable of keeping fifty large co-operative factories going in the manufacture of cheese and butter. They would find in New Brunswick the grandest of mountain scenery, joined to a very productive soil and climate. In the Annapolis Valley they had fifty miles of apples with bright, well-coloured skins and good flesh, and that would keep well into the following spring. In Nova Scotia they have a manufactory of condensed milk. They had a splendid clear atmosphere that kept the milk pure during the manufacture. It would not be possible to make condensed milk so well here, owing to the air. Not that he had anything to say against London air—why, it was full of things. (Laughter.) In the Antigonish Valley, the county of the Premier of Canada, Sir J. G. D. Thompson, there were a number of large cheese factories. New Brunswick was best known here as a lumber-producing country, but the people were beginning to develop cattle-raising and

BUTTER AND CHEESE-MAKING.

They exported the products in distinctive Canadian packages. They had examined and tested the packages of all parts of the world, and had made one combining the best points of each. This would be the best of the lot, and would have a distinctive Canadian shape. He warranted that no Danish butter could be found which would be better. Certainly they would get none anywhere where the people had more cleanly habits in their homes. It was worth a lot to know that their butter was made by people of clean and respectable habits like those in their own homes. He would not eat butter from some places—they could not tell where the milk had been set. (Laughter.) New Brunswick had voted £2,000 for the maintenance of travelling dairies to go all over the province, and show the best methods of making butter. That was in addition to the money provided for similar purposes by the Dominion Government. The two co-operated together. The cheese made in the province was excellent. They sent some to the great show at Liverpool, and though they were at disadvantage owing to the time of year at which they were produced, they secured a high position. There would be some excellent cheese from the province in the future; the clear, cool evenings gave the people there a special chance of making the firm body and sweet flavour, which was what London merchants seemed to want. In Quebec there was a French district whose people were perhaps not well understood in other parts, but he was surprised that in Bristol, where they should know more about Canada, being nearer than London—(laughter)—they had passed a resolution proscribing the cheese from a certain district. Did they ever hear of a tailor proscribing cloth from a certain district? No; of course he would proscribe the make and not the place. There were cheeses in Quebec as fine as anywhere, but the people in Bristol wanted to prevent cheeses coming from that part as "finest Canadian cheese." Let them demand a cheese perfect in flavour, solid in body, without crack in the rind, perfect in shape, before they call it finest Canadian cheese. If it came from Quebec it made no difference. Let their standard be in quality, not in place. The educational establishments in Quebec, as in New Brunswick, were sustained both by the Provincial and Federal Governments. The people here were the firmest optimists in a country full of optimists. If they had skies like that of London they would be the most pessimistic people in the world. But their splendid air made them hopeful, and they relegated pessimism to people with whisky livers or tobacco hearts, or to disappointed politicians. (Laughter.) In Ontario there was a splendid farm supported by the Provincial Government.

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THE LARGEST CHEESE IN THE WORLD,

had been made at one of the Dominion Branch Experimental Dairy Stations, at Perth, in Lanark County, Ontario.

It was not made to give occasion to brag about the cheese, but to advertise the magnitude of the industry. It weighed 22,000 pounds, and was going to the World's Fair at Chicago. By and by it would come to London—he had pretty well negotiated it—and this would get Canadian cheese talked about and the more it was talked about the more they would ask for it in the grocers' shops. (Laughter.) They might smile at this, but people would ask for anything that was sufficiently talked about. One day the *Daily Telegraph*, by mistake, spoke of some butter at an exhibition in London as covered with "suet," instead of "salt." The next day fully a dozen people came and asked him for some of the "butter covered with suet," as they wanted to try it. (Laughter.) In Ontario there were over 800 cheese factories, with an annual output of five million dollars' worth. The cheeses known as "Ingersolls" were better known in this country than the "Brockvilles," "Bellevilles," and many other makes, but efforts had been made to establish a uniform system of manufacture, and the methods employed were now so nearly alike that "Ingersolls" were equalled by cheeses from many other parts. They were trying to get the railway companies to give them better facilities for sending cheese safe and entire. He would like the members of that Exchange to put through the stiffest resolution they could asking cheese makers to put better boxes on their cheeses. He had some boxes which cost three cents over the regular price, and they had been brought here and to Liverpool, and not one in fifteen was broken. If the cheesemongers had a stiff resolution here saying that cheeses in undamaged boxes were worth more they would see it paid to get better boxes even at two or three cents more a piece. Their railway companies were like those in England—very good, but not yet trained to act on the principle of doing as they would that others should do unto them. (Laughter.) It was "just as much as the traffic will stand," that was their motto there and here. (Laughter.) In this province this year there were now 18 co-operative factories making butter on after October, with 50 in Quebec, a total of 68 against only two last year. In Quebec, the provincial Government gave a fairly large bounty on milk supplied to creameries for the manufacture of butter from November to March. He would have spoken of Manitoba and the North-west but that they were not of particular interest to his hearers at present. From Manitoba they had in the past sent merely wheat. Hereafter they

WOULD SEND BACON, BUTTER AND CHEESE,

and would use the grain mainly as food for live stock of some kind. On the other side of the Rocky Mountains they had a fruit farm, and the district was a paradise for tree growing. The trees grew so fast that he had never seen any like them. He would not say they were as tall as the Americans had them. An American told him it took two men to see to the top of some of their trees, they were so tall. (Laughter). They had fertile valleys in the British Columbia district, where he had seen four tons of hay to the acre, and 126 bushels of oats to the acre. He did not say those were typical cases, but they showed the food-producing capabilities of the region. They tried to give their people protection against all kinds of imitations and frauds in business. They had been helped wonderfully by the newspapers of Canada in making information for the whole people from the highest to the poorest. From all they had hearty co-operation in making the farmers understand their business better, and the Governor General, Lord Stanley, took an active interest in all that concerned the farmers. At a meeting which the speaker attended, Lord Stanley gave one of the best addresses he ever listened to on the marketing of farm produce. He did not talk a fiddle-playing jugglery to amaze and amuse the people, but good sound sense, giving the farmers a correct opinion about their own business. Canada was a part of this great Empire, and he wanted to see a fashion of using Canadian produce. Fashion had a good deal to do with it. They, the merchants, moulded the sentiment of the people, and sentiment grew. He would not buy of some men

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if he could make £500 a year by it, he had an aversion to them; and there were other people he did like and was always ready to buy from especially if they gave better value. (Laughter.) They were trying in Canada to give better quality, to give the very best, and his hearers should try to foster a sentiment which would encourage them. They wanted no favours, just a fair price for their goods. They wanted the good wishes of England, and a little higher prices for next year's cheese. (Laughter.) He hoped members of the Exchange would do him the kindness to make any suggestions they could to him. Anything addressed to "Dairy Commissioner, Ottawa," or even simply "Dairy Commissioner, Canada," would reach him. He would like them to make suggestions in regard to any questions that occurred to them. They would thus be helping their own business by helping Canada to meet their wishes. He thanked them for listening so kindly to him, and hoped that conferences in coming years would be for the advantage of both countries. He concluded by conveying to them the best wishes of the Canadian farmers whom he represented. (Cheers.)

Mr. J. WHEELER BENNETT said that having been connected with Canada for many years, and, as representing the largest packers there, he would like to ask Professor Robertson one thing. They suffered considerably from want of continuity of supply in hogs. At times the supply gave out entirely, because the farmers killed at home. If the lecturer could suggest to the farmers to keep up a regular supply, it would do the curing interest a great service.

Professor ROBERTSON said the Minister of Agriculture had recently sent round a special circular on this very subject.

Mr. BROWNE WEBB said whilst in Canada he had an opportunity of seeing this system of experimental farming, and met the Minister of Agriculture and Mr. Robertson, who received him most courteously. He went pretty far west and could bear witness to the truth of Mr. Robertson's statements. He did not think that gentleman had overstated any of the facts, and he considered Canada to be one of the future food-producing countries of the world. (Hear, hear.)

Mr. J. R. WEBB said that they must allow him to propose, on behalf of the members of that Exchange, a vote of thanks to Mr. Robertson for his exceedingly bright, happy and pleasing address. There was a good deal of appropriateness in making the address there and to that audience. Professor Robertson came there to interest them in this country of Canada, which had already taken a prominent place in food production for the supply of England, and was capable of taking a much larger place; and he was addressing a number of gentlemen whose whole efforts were constantly given to a very difficult and delicate problem—that was, to the supply of the food of the population of London and the immediate neighbourhood. He thought they were so accustomed to let the matter pass on day by day in its ordinary course that they hardly realized what it really meant. Here was a population of something like 5,000,000, for whom they, or some of them, had to find food day by day—neither too much nor too little, neither too cheap nor too dear. But all this was done in the most quiet and unobtrusive manner, through the energy, enterprise and intelligence of persons engaged in the trade, whether as merchants or as dealers in their various branches. They should remember that owing to the size and conditions of London, which were very different from those of most other towns, this food had to be taken day after day to the very breakfast tables and dinner tables of the people. The machinery for this vast distribution had to be kept at work from day to day, and every year the population kept flowing about, generally more and more out into the suburbs, and had to be followed, so that there were constant changes in the arrangement of that machinery. It went on in this easy and quiet way, and they were all much interested in hearing and knowing what was being done to help them in the distant countries where the food was produced. They, all of them, so far as that Exchange was concerned, took considerable interest in endeavouring to improve and assist the trade in various directions, and especially in the improvement of quality. They did so for this reason, that London was not only such a large and important market, but was the market of the world where fine goods and fine quality

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were always sure of meeting with due appreciation. (Applause.) They had of course perhaps not a wholly disinterested feeling in this matter, but he would just like, in passing, to ask Mr. Robertson if he could only bring them the proofs of the enormous fortunes that they were said to be making. (Laughter.) His experience was that no business in England was done on a smaller percentage of return to the people who gave their time and expenditure to it. That, however, had nothing to do with the point. The better the goods were in quality, the more easily they could sell them, and whether the profit was much or little, it was easier to do business, and the business itself was more satisfactory, so that their interest was the same. He had been reading with great interest the reports that had come over of Mr. Robertson's work on the other side. It struck him they were doing a very good and beneficial work there, and there was great scope for it. The lecturer had well pointed out that the raw material of dairy products—milk—was always the same whether they were well or ill made, so that it did not cost any more to make good butter or cheese than bad. (Hear, hear.) There was no extra expenditure in producing the finished article to make it finer, so that there was an indefinite scope with the farmer for the improvement of his products. The lecturer had been speaking about the great interest taken in England in politics, and he felt considerable sympathy with the strictures passed by Mr. Robertson on the subject. It was not creditable to the press that so little interest was taken in the ordinary matters of country life in regard to agriculture and gardening. (Hear, hear.) He himself felt that it was a noble ambition to raise the condition of agriculture, and the man who did anything to improve and raise the quality and purity of the food of the people was doing a good service in his day and generation. (Cheers.)

Mr. A. J. ROWSON seconded the vote of thanks, and said it would be greatly to the interest of the trade to get their goods of the right quality, provided they were not of too high a price. He was sorry to say he did not know any one who was making a fortune out of Canadian cheese, or even making much profit out of it. (Hear, hear.) But they could make a little more out of it than out of cheese from the United States, and he took it that that was a feather in the cap of Canada. (Hear, hear.) As to what Mr. Robertson had said about the amount of attention devoted by Englishmen to their diet, he thought that with such an atmosphere as had been described, full of disease germs, they were bound to pay some attention to their stomachs. ("Hear, hear," and laughter.) They must at least have food that was palatable. He hoped next year they might be able to tell Professor Robertson they had done better with the cheese of 1893 than with that of 1892, and that they had not taken all the cream in Canada. (Laughter and cheers.)

The CHAIRMAN, in putting the resolution, said that Mr. Robertson must not forget that they wanted Canada to take English manufactured goods in return for the food imported. In that simple interchange lay the true wealth of nations.

The vote of thanks was carried with applause.

Professor ROBERTSON, in responding, also proposed a resolution of thanks to the Chairman for presiding. He was able to bear testimony to the business reputation for commercial integrity of English merchants among those who dealt with them on the other side of the Atlantic. That reputation had had the happy effect of making Canadian merchants strive to follow their good example. If any of the gentlemen present would call on him at Ottawa at any time, he would endeavour to extend to them the same courtesy as had been extended to him during his stay here. (Applause.)

(6.) *From the "Free Press," Aberdeen, 14th January*, 1893.

## CANADIAN *V.* ABERDEENSHIRE AGRICULTURE.

In another column we give in brief summary form an account of the recent visit to this country of Professor J. W. Robertson, of the Central Experimental Farm at Ottawa, who holds also the appointment of Dairy Commissioner and Agriculturist under the Dominion Government. Mr. Robertson has twice reported officially on the subject of dairying, and carefully-tabulated results of experiments in feeding

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cattle on different foods have been published for the information and guidance of Canadian farmers. As concerns dairying, very considerable progress has been made, with satisfactory results, in the establishment of cheese factories, in Ontario more especially. The quality of the cheese produced has been distinctly improved, and its character in the market established. Mr. Robertson does not claim that the same progress has been made in the production of butter on a systematic scale, and of a quality to take the British market, but he states that he has induced the Government to take steps for starting creameries in connection with the cheese factories. As regards the whole question of dairying, the system pursued in Canada of bringing the milk to a centre for wholesale manufacture into cheese or butter, the separate deliveries of milk being recorded and the particulars marked on being sent in, and the product divided amongst the individual owners in the same proportion, has not readily "caught on" in this country. And without guarantee as to the uniform quality of the milk brought in, there is undoubtedly a drawback to the system not easily got over. A more important point, if not as regards Canada, certainly as regards the agriculture of Aberdeenshire and the surrounding districts, is, however, raised in the question—How far is achievement of the best dairying results compatible with achievement of the best results in the rearing of cattle of a class fit to take the best place in the great London meat market? That is a point to which, as matters stand, the attention of the Canadian Parliament and its active and intelligent Dairy Commissioner and Agriculturist may without offence be directed. The production of excellent butter and cheese on the old domestic lines is not a thing at all unknown in Scotland. It has long gone on in Ayrshire, and does so at the present time; but then the mass of the Ayrshire farmers live by dairying, and have cows noted as milkers, but by no means noted as beef-producers. And in Aberdeenshire practically the reverse of this has obtained during the past forty or forty-five years. Beef has been produced of the first quality with a success not equalled elsewhere, but dairying has had to go into the background in consequence.

That Professor Robertson and his collaborateurs at the Ottawa Experimental Farm have done valuable work in spreading abroad information as to the exact results arrived at in feeding stock on different varieties of foods, as well as in the growing of special crops on fixed areas, is evident. But the question may, without offence, be asked—What about the general standard of the stock reared as regards their beef-producing qualities? That is undoubtedly the question that most deeply interests people in this north-eastern district of Scotland, which may fairly claim to have a pretty intimate connection with the Dominion from the fact, in the first place, that so large a proportion of the early settlers in Ontario went from these regions; and, in the second place, because within the last few years a considerable trade in the importation of Canadian store stock has been established at Aberdeen. The figures, exclusive of young calves and sheep, show that within the past four years the number of Canadian "store" cattle landed at Aberdeen has been 48,360, or an average of over 12,000 a year. And to meet the local demand amongst farmers prepared to "feed off" for the London market, probably almost double that number would find purchasers; we discount, of course, the recent scheduling of Canada, a step which the Minister of Agriculture had perforce to take, rightly or wrongly, after the report by the veterinary experts of the Department that pleuro had been discovered amongst cattle from Canada. It is not to be believed that the embargo will be permanent. But, as the shrewdest and most long-sighted of our agriculturists have for long held, it is of vital consequence for our home farmers to maintain the character gained for cattle in Aberdeenshire by noted breeders of both Shorthorns and Polls more than thirty years ago, and in virtue of which as "prime Scots" they were so long able, without challenge, always to command the highest prices in the London market. We are sorry to believe that during recent years of depression this character has not been fully sustained even by a not inconsiderable proportion of cattle of home rearing. And there need be no hesitation in saying that the shiploads of Canadian "stores" received year by year have contained by far too great a proportion of scraggy, ill-bred, unshapely brutes to do anything else than accentuate the evil, which of course means ultimate selling in the London

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market at probably a third less price than could be got for well-bred beasts, which are easier to keep from birth, and can always be more readily fattened. If, then, the Canadians want to continue and extend the trade in store cattle to the North of Scotland, the question of having them bred of uniform good character and quality cannot be too early or too closely looked at. It will be a real service to the home farmer, while benefiting themselves. And we can only regret that Mr. Robertson's briet visit to Aberdeen did not allow him time to meet a gathering of leading Aberdeenshire farmers for the discussion of such points as we have touched upon. We have not the least doubt that, although his special commission does not embrace stock-rearing, it would have been to mutual advantage to have had a frank interchange of opinions on the subject.

(7.) *From "Bell's Weekly Messenger," London, England, March* 20, 1893.

## THE AGRICULTURAL INTEREST IN CANADA.

There are many interesting and useful lessons which we could learn from our colonies and foreign countries, but none could be made more clear than that it pays well for the Government to foster and encourage, in a practical manner, the home agricultural interest. During the past few months the Canadian Government has shown clearly that practical help *can* be given in this matter, and that, too, without any very great expense. There is in the Dominion a very efficient staff of agriculturists, with Experimental Farms in each of the provinces, as well as a Government department, also with a practical staff. Among the latter none are more efficient or more earnest on behalf of the agriculturists of our nearest colony than Professor J. W. Robertson, the Government Dairy Commissioner, who recently paid a visit to this country. The object of his visit was a very practical one, being to study the markets, tastes, and requirements of the United Kingdom, in order to bring these under the notice of the agriculturists of Canada. He came primarily to investigate the newer preferences of the British consumers of dairy products. It was realized that it does not pay to send to market a food product, unless it be of the sort, quality, and appearance which the expected customers will want. The Canadian farmer cannot afford to lose money while he is trying to educate the British consumers up or down to the standard of what he thinks would be the best sort of food for them. The Government inquiries were intended to guide the farmers into meeting the preferences or prejudices of markets, and to suggest to business men how they can follow up opportunities with enterprise and profit. The information disseminated on Professor Robertson's return, if not always apt to local circumstances, must be suggestive and stimulating. Then, again, Professor Robertson addressed meetings of the merchants in Liverpool and London, who import food products from Canada, upon the products themselves, and the value of Canadian trade. It is expected that these gatherings will become annual hereafter, in five or six of the large cities of Great Britain. It was believed that the business interests of both countries—agricultural and commercial—must be promoted by a better acquaintance of the methods of producing commodities on the one continent, and the means of distributing them to the ultimate users on the other. Professor Robertson also laid before the public, through the press and other agencies, something of the experimental and educational work which the Canadian Government are carrying on for the benefit of the farmers.

On the Experimental Farms and Experimental Dairy Stations in Canada are carried on original investigations into the growth of cereals, the growth of forage crops, the feeding of cattle, the fattening of swine, the rearing of poultry, the cultivation of fruits, etc., etc., the main endeavour being to bridge over the gap which has existed between the attainments of agricultural science and the practice of the ordinary farmers. They are meeting with fair success, and what formerly was exclusively the knowledge of the few is becoming the common property of the many.

In the course of his investigations and journeys into different parts of England and Scotland, some aspects of the harmony of interests between the British and Canadian farmers became more evident, and on several points the following notes were obtained from him.

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"I am convinced that of the two millions of pounds' worth (£2,000,000) of cheese which are imported into Great Britain from Canada annually, not more than two-thirds of the quantity are sold to the consuming purchasers as Canadian products."

"The retail butchers in different places informed me that 'only the rough shops with cheap cuts' sold Canadian or American beef. The fact is that English eaters are daily purchasing and consuming fancy Canadian cheese and prime Canadian-fed beef under the guise and name of 'the best English.' That is a manifest and gross injustice to the British farmers, and is of no benefit or gain to the Canadian farmers.

"Of course it would be difficult to frame and administer legislative enactments which would remedy the evil; but most things for the benefit of the public or the individual, which are best worth doing, are hard to do well. Parliaments elsewhere have sunk themselves to the level of a finance or finding committee for any interest powerful enough to enrich the representatives of the people at the expense of the public. Nobody expects the British Parliament to act in that way towards agriculture or any other interest; but it seems the clear duty of Parliament to legislate in such a way as to secure fair play to every one in every plane of his activities as a citizen, and particularly to prevent fraud or unfairness through misrepresentation. The middleman may defraud the customer to whom he sells, by misrepresentation of goods, or he may defraud the producer of the same by a misrepresentation to the ultimate purchaser. Have the British farmers no proprietary rights, calling for legal protection, in the names of 'English beef,' 'Scotch beef,' 'English cheddars,' 'Scotch cheddars,' etc.? It seems not.

"Since the proclivities of the established mediums for distributing fresh beef in England and Scotland to the householders tend to widen the prices which are paid to the producers and are paid by the consumers respectively, to an extent which is out of all reasonable proportion to the service which is rendered, Professor Robertson is hopeful that the Canadian authorities will take steps to remedy that deplorable state of affairs in the interests of our farmers.

"The climatic and soil conditions of England and Canada are different in respects which are seldom recognized or pointed out. The cold and continuous frost of the long winters in the Dominion permit the retention in the soil of those nitrates which would otherwise be drained out. By competent authorities in England it has been estimated that the drainage from November to March carries off a quantity of nitrates per acre sufficient for an average crop of wheat.

"The warmth of summer in Canada brings forage crops to a robust perfection of growth, which makes the feeding of cattle for beef or milk a source of profit during the winter. The country which was the native home of millions of buffaloes is the natural home for neat cattle, which it maintains in the bloom of vigorous health.

"The scheduling of Canadian steers, because of a rumoured instance of pleuro-pneumonia, will not be an unmixed ill or much of an injury to Canadian farmers if it compels them to fatten their beasts to a finish before they are shipped from the country.

"The compulsory aspect of it is distasteful, but on many occasions the economic salvation of individuals and nations has arisen from some occurrence which compelled them to reconsider and examine their circumstances and practices with the energy born of self-preservation.

"The abilities of intelligent farmers in both countries will find plenty of scope for profitable employment, mainly in producing the finer and more concentrated qualities of food, such as butter, cheese, milk, beef, pork, mutton, poultry, fruits, &c. The common people are now well enough off to be able and willing to pay for the exquisites in flavour and appearance in their food, which is no longer purchased merely to meet the necessities of hunger. In the west and south-west of Scotland, where dairying is the mainstay of the farmers, I found only a hearsay, a newspaper or an academic acquaintance with the subject of agricultural depression. Throughout those districts Canadian instructors in cheese-making have been employed for five

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or six years. It does not follow that profitable farming has been maintained wholly or mainly by that help; but it is an acknowledged fact that the intrinsic quality of the cheeses and the relative price which they will fetch have been improved to a point indicated by from 20 to 25 per cent.

"The wiseacres of England may continue to pooh-pooh the lessons which may be drawn from the ventures and enterprises of a young country like Canada; but those who are seeking to provide remedies for the distress which is reported to have fallen upon agriculture in many districts of Great Britain will be not less competent for that task by a careful study of what the Canadian government are doing.

"Somebody must own—or at any rate somebody will own—the land for many years to come. The owners must have a return for the capital invested, unless capital loses its value for use otherwise and elsewhere. The least considerate of all landlords is *less merciless* than a corporate mortgagor who insists upon getting the whole of his 5 to 7 per cent net, with no return or disbursement for the erection or maintenance of buildings. The tax collector is not in the habit of making rebates in bad seasons or any seasons."

Such were a few of the objects and results of Professor Robertson's visit to this country, and it cannot be doubted but that in sending him the Canadian government have done good service for the Canadian farmers. In fact, we have waited a week or two before noticing the subject in order to see what good would come of it. A large merchant in foreign produce now informs us that it is evident that the visit will be "brimful of good to the Canadian trade, inasmuch as the products are already being selected with greater care than in the past," while "in the future what will come will be just what the markets want."

When, we would ask, will the British government take as much care to inform the British farmer on the requirements of the markets of even his own country? Canada should teach us a lesson on this point.

## PART VIII.—MISCELLANEOUS MATTERS.

### (1) Relating to Cheese from the Province of Quebec.

Considerable attention has been attracted during the year to the improved and improving reputation of cheese from the province of Quebec. Acting on instructions received from you when I was in England in December, 1892, I communicated with the Honorary Secretary of the Bristol Provision Trade Association in reference to a resolution proposed for adoption by that association which appeared to discriminate against "French Cheese." I submit copies of the correspondence.

Bristol Provision Trade Association, 55, Victoria St.,
Bristol, 17th December, 1892.

To J. W. Robertson, Esq.,
Adelphi Hotel, Liverpool.

Dear Sir,—Inclosed herewith I beg to hand you copies of the resolution you wired for.

You will notice that the rule will require confirmation at our next general meeting, which will be held early in the new year. Should you have any remarks or suggestions to make, I shall be pleased to bring them before the meeting.

By the word on the telegram "Commissioner" I presume you are acting for the Canadian Government, or Board of Trade.

I am yours truly,

W. T. PARKER,
*Hon. Secretary*



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*Bristol Provision Trade Association.*

The following resolution was adopted as an addition to the rules of the Bristol Provision Trade Association, at a committee meeting held 15th November, 1892, and will be submitted for confirmation at the next general meeting:

"Cheese made in the French section of Canada may not be tendered in fulfil-"ment of a contract for 'finest Canadian cheese.' The seller is entitled to deliver "cheese made in any part of Canada other than the French section."

It was further resolved "that copies of this resolution be furnished to each "member of the association."

W. T. PARKER,
*Hon. Secretary.*

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LIVERPOOL, 19th December, 1892.

W. T. PARKER, Esq.,
Honorary Secretary,
Bristol Provision Trade Association.

DEAR SIR,—I have received your favour of the 17th instant, with which you inclose copies of a resolution adopted by a committee of the Bristol Provision Trade Association regarding "cheese made in the French section of Canada." And as you do me the honour of inviting me to offer remarks or suggestions on the substance of the resolution, I desire to submit the following facts for the consideration of your association:—

1. I think I am warranted in believing that the sole object of the resolution is to protect purchasers from being compelled to receive "in fulfilment of a contract for finest Canadian cheese" any cheese of inferior quality as to the cheese, the finish, the boxes, or the condition.

2. I submit that a description of the quality of the cheese and not the proscribing of cheese from any section of Canada, would meet the needs of the case with more satisfaction and benefit, alike to the British merchants, the Canadian merchants and the Canadian producers.

3. I respectfully suggest that a resolution of the following import would be adequate and useful: "Only cheese which have a clean, sweet flavour; a sound, solid and rich body; uniform colour, which is not mottled; rinds free from cracks; neat, workmanlike finish; and good close-fitting boxes, may be tendered in fulfilment of a contract for finest Canadian cheese."

4. In my opinion the adoption by the Bristol Provision Trade Association of the resolution which has been accepted by the committee, would be detrimental to the cheese trade between Canada and Bristol, and to the producers of cheese in large districts in Canada, where finest cheese are now being made.

5. As a matter of fact, Canadian cheese on the markets in Great Britain and in Canada, are sold mainly upon the merits of their intrinsic quality; and I am aware by personal examination of the goods, that, in some of the "French sections" in Canada, cheese are now manufactured which are as fancy in quality as any from any section in the Dominion.

6. In some sections of Quebec, the cheese are not yet as fine as they might be or as they will be; very great improvements are being effected every year through the work of travelling instructors, and the formation of syndicates of factories, under the care of competent inspectors and the issuing from my office of bulletins of particular directions for every month of the season. In the province of Quebec, during last summer, about 300 factories partook of the benefits of the visits of these travelling instructors and inspectors.

7. If the want of full information concerning the progress of the cheese trade in Canada and the geographical areas where fancy cheese are now being made, permits the Bristol Provision Trade Association to proscribe a certain quality of cheese, this

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season, the same spirit may include the provinces of New Brunswick, Nova Scotia and Prince Edward Island, in the list of areas to be scheduled next year, particularly to the injury of the Bristol importers.

8. No other Provision Trade Association or Exchange on this side has proposed such an inadequate and misleading enactment.

9. Last year I made a shipment of cheese from the province of Quebec to Liverpool; they were branded as such in large letters; they were sold at the very top market price on their merits and under their own provincial name.

10. I have made similar shipments from New Brunswick and Nova Scotia; they were branded as such in large letters; they were also sold at the very top market price, on their merits and under their own provincial name.

11. This year I have shipments here and in London from Ontario. Some of them have been sold for 1s. 6d. above the highest price quoted in the public reports.

12. I have shipments on the way from Prince Edward Island, which I expect will please as well and sell as well as the best cheese from Ontario.

13. If you will be good enough to designate a firm in Bristol, or to receive the same yourself, I shall be glad to send a 10, 20 or 50 box lot of these Prince Edward Island cheese for the inspection of the members of your association.

14. I have no cheese here at present from the "French section of Canada;" but when I return to Canada, I shall be glad to send a few hundred boxes of cheese from the French section to any firm in Bristol which your association may designate, for sale, in order to show the quality of some of the cheese to the members of your association, and to obtain their opinions as to how they can be improved further to meet the views and preferences of your trade.

15. I am anxious to learn what is wanted in quality and in package to meet the wants of English merchants and consumers; and if your association will give me an opportunity, I shall be glad to meet its members in conference and to learn from them how our department in Canada can serve the interests of the dairy industry there by giving effect to any recommendation your association may make.

16. I have sent you a few copies of my annual report for last year, in order that you and the members of your association may learn the nature and scope of our work.

Letters addressed to me, in care of office of High Commissioner for Canada, 17, Victoria Street, London, S.W., will be forwarded to me.

I have the honour to be, sir,
Your obedient servant,
JAS. W. ROBERTSON,
*Dairy Commissioner.*

I have observed with pleasure and satisfaction the progress which has been made in dairying in all parts of the Dominion during the past few years. It has been my unswerving aim to render, as far as practicable, equal assistance to dairymen in all the provinces alike, according to my opinion of their need. In Ontario I have given most prominence, most time, thought and labour to the forwarding of the winter dairying movement. In Quebec, I have striven more zealously to help in the work of getting the cheese up to a standard in quality and reputation which will make them creditable to the brand "Finest Canadian." In the Maritime Provinces my endeavour has been mostly in the direction of furthering co-operative dairying and disseminating information on the growing of Indian corn and other forage crops for the cheap feeding of cattle. Much other work of a general character has been carried on with an equal degree of earnestness in all the provinces—except British Columbia which has been rather neglected.

The success of these particular aspects and branches of effort in the different provinces will be for the common benefit of all. In order to illustrate the consistent continuity of effort along these lines, I have collected extracts from reports of addresses delivered by me at different times bearing upon improvement in the quality of cheese from the province of Quebec.



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*Extract from Report of Dairy Commissioner for* 1891-92, *page* 15.

"Partial superintendence and assistance were given at the Dominion Dairy Show, held at Sherbrooke, Quebec, on 1st to 5th September, 1891. At this exhibition there were gathered in competition cheese from Quebec, Ontario, British Columbia and Nova Scotia. I was assisted in the judging of the cheese by Andrew Clement, Esq., Glasgow, Scotland, one of the largest and most experienced importers of cheese into the Scottish markets, and D. M. Macpherson, Esq., of Lancaster, Ont. The quality of the cheese was generally excellent. In my opinion, which was concurred in by the two gentlemen whom I have named, the quality of the cheese on the whole was the finest ever examined at any exhibition held in Canada. The display of butter included packages from British Columbia. The creamery butter from the province of Quebec was exceptionally fine. The exhibition brought to light in a more prominent way than could otherwise be done the great advancement made in dairy practices and in the improvement of dairy products in Quebec during recent years. The friendly rivalry which exists between the sister provinces for holding the first place in the Dominion in the reputation of their products will tend to the advantage of dairymen in them all."

*Extract from Report of Address at the* 15*th Annual Convention of the Dairymen's Association of Eastern Ontario, held at Cobourg,* 7*th and* 8*th January,* 1892.

"In the province of Quebec every county was visited by our travelling instructors; and the quality of the cheese from that part of Canada has been very greatly improved during the last two years. Some work of experimental investigation was carried on at the cheese factory at Dunham, Quebec. The milk in the Eastern Townships and in other parts of Quebec seems to be richer in fat constituents and also in flavour than that in the more level portions of the Dominion. At the Dominion Dairy Show, which was held at Sherbrooke, Que., cheese made in the province of Quebec came into competition with the product of some of the best factories in Ontario. The Quebec cheese carried off the Dominion sweepstakes. On the whole, the display of cheese on that occasion at Sherbrooke was the best in quality which I have ever examined."

*Extract from Report of Address at Quebec,* 31*st May,* 1892.

"After referring for a moment to our cheese and butter trade, let me say this: that during last year at the large Provincial Exhibition held in the city of Sherbrooke, we had, I think, one of the finest and largest collections of cheese which I have ever seen in this country or in England, or Scotland. In the judging of these cheese at Sherbrooke, one of the most eminent and extensive importers of cheese into Scotland and England was associated with me. His verdict was that, on the whole, these cheese were the finest that he had ever judged; and in that competition, cheese from the province of Quebec carried off the first prize with the Dominion Sweepstakes and Gold Medal. I can recollect that a few years ago, cheese from the province of Quebec sold from half a cent to one and a half cents per pound lower than those from the province of Ontario; whereas in some cases now, cheese from the province of Quebec are bringing almost equal prices. You can make just as fine cheese in the province of Quebec as are made anywhere in the Dominion; and through the enterprise of some of your public men, the work of instruction and of giving information to cheese-makers has been so successful that Quebec recognizes that she may be able to take first place.

The holding of the Dominion Dairy Show was largely due to the efforts of Mr. Rufus Pope, M. P., and Mr. H. S. Foster. Both took a very great interest in its establishment and management; and every public movement like that which is conducted to a successful issue brings credit to the province.

On sending these cheese to England afterwards, I received the most creditable reports of their quality; and the additional attention which has been called to the quality of cheese from Quebec has caused more inquiry for cheese from Quebec than heretofore."

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*Extract from Report of an Address at St. Hyacinthe, Que., 29th October*, 1892.

"Quebec has long enjoyed a good reputation for the excellent quality of its butter. The more I see of the province, its people, its pastures, its streams, its forage crops and its cattle, the more I am assured that it is admirably adapted for successful dairy farming. Until last year the cheese from the province of Quebec did not reflect much credit on the manufacturers. Very great improvement, however, had been made within three years. A gratifying illustration of this was given at the Dominion Dairy Show at Sherbrooke in 1891, when a British judge, who could not be partial to any district in Canada, stated that the cheese from Quebec were among the finest he had ever examined at any exhibition on this continent or in Great Britain. The honours won at Sherbrooke in 1891 were more than maintained by the cheese on exhibition there again during the present year, 1892. Sample cheese from some 20 different factories were selected at Sherbrooke, at the close of the exhibition, by me, and were forwarded to the great Industrial Exhibition at Toronto, to be compared there with the cheese of Western Canada, by some of the leading buyers of cheese in Ontario. No expense in this connection was borne by the Government. The following report from the Toronto newspapers shows what a capital impression the cheese from Quebec made on those who examined them :

"TORONTO, ONT., 14th September, 1892.

"To the President and Directors of the Industrial Exhibition :—

"GENTLEMEN,—On carefully examining a lot of 29 cheese from 18 different cheese factories in the district of Bedford, Quebec, we find them to be well made cheese, of uniform and excellent quality—on the whole superior to the cheese on exhibition here from any other part of the Dominion, and we strongly recommend that a gold medal be awarded to the President of the Dairymen's Association of the District of Bedford, Que., for an exhibit of such superior quality. We desire to record our high appreciation of the improvement and fine quality of the cheese which have come to the exhibition from a district where the cheese-making industry is comparatively new.

"All of which is respectfully submitted.

"E. CASSWELL,
"JOHN PODMORE,
"A. F. MACLAREN,
"JAS. W. ROBERTSON."

"The fact that the market price for cheese in many of the districts of Quebec has been quite equal to the price realized by the leading factories of Ontario further attests the progress which the dairymen of this province have made. I am glad to know and to assure you of the fact that in all Ontario there are not two men who grudge the people of Quebec their success in these matters; and for myself I shall be glad to know when the time comes, that Quebec has made so much advancement, and has made dairy products of such excellent quality that they will rank among the foremost at the World's Fair, as well as at Sherbrooke and Toronto."

*Extract from Report of Address at Liverpool, England. From the "Liverpool Daily Post," of December 21st*, 1892.

"Quebec is a province whose inhabitants are people full of hope, courage, and optimism. They are by far the greatest optimists on a continent where pessimism is an unthrifty exotic, which the brilliancy of Canadian skies and the exhilarating dryness of Canadian air relegates to the crypts of whisky livers, tobacco hearts, disgruntled professors, or disappointed politicians (laughter). The people are becoming most wisely enthusiastic about their own work. Educational agencies for the benefit of the farmer and the development of the food-producing resources of the province are being promoted by both the Federal and Provincial Governments. Very

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great improvements in the quality of the cheese from these provinces have been effected during the past few years. Many cheese factories and butter factories now turn out a quality of product quite as good as the best from those in Ontario. I have been surprised to observe that a committee of the Bristol Provision Trade Association has accepted a resolution which reflects upon the quality of the cheese from a particular district in Quebec. Cheeses from the French district of Quebec are now made in large quantities, in syndicates of cheese factories which are under the supervision of competent instructors and inspectors. They are not at all what they were a few years ago. The sweet grasses, pure spring water, cool nights, cattle of excellent breed, and people of enterprise, all promise a very rapid extension of the trade between Quebec and Liverpool in a high class of food products."

*Extract from an Interview published in "The Montreal Star," of January 21st, 1893.*

"Many complaints were made to me of the poor quality of the boxes in which cheese has been sent, particularly from the province of Quebec. The cheese which were sent over from the Experimental Dairy Station at Perth, in Lanark County, Ont., had less than 6 per cent of the boxes broken to any extent, when they reached the London and Liverpool warehouses. Good sound boxes give an additional value to the cheese of from 1s. to 2s. per cwt.; and the extra cost of those strong boxes was only 3 cents each. I hope the cheese-makers, patrons, salesmen and buyers together, will insist upon the use of only strong, close-fitting boxes, quite dry before they are put on the cheeses.

"I found Canadian cheese still growing in favour with wholesale dealers and retailers. In the Manchester district the fat cheeses from Quebec have not met with particular favour. The irregularity in shape and size, the unworkmanlike finish, and the wretchedly bad boxes were the worst features of some cheese from that province. These defects could all be remedied in one season by a little more care and taste. The French race have the reputation of putting up goods of all sorts in the daintiest and most attractive form. The French-speaking dairymen of Quebec should try to maintain the good name of their people in that regard. The fact that it would pay them handsomely to do so, should not be a deterrent."

*Extract from Report of a Speech at the Agricultural Congress, held at Quebec, 24th January, 1893.*

"You may have heard that some people in England have objections to the quality and name of some food products from the province of Quebec. Lately, while I was in Great Britain, the Honourable Mr. Angers, the Minister of Agriculture for the Dominion, sent me a cablegram, asking me to shed a little light that might dispel the prejudices about Quebec or French cheese, which were blamed for being inferior, when in many cases, they were certainly most excellent. A committee of the Bristol Provision Trade Association had recommended the Association to adopt a resolution which practically classified all cheese from the French-speaking district of Quebec as being of a lower grade than finest Canadian cheese. That action or proposed action furnished an opportunity for calling the attention of the merchants in Great Britain and Canada to the superior excellence of much of the cheese made in the province of Quebec, during the past season. Throughout the Eastern Townships and in the district of St. Hyacinthe, as well as in other parts of the province, many of the cheese factories turn out a product which pleases the merchants in some markets in Great Britain quite as well as, if not better than, cheese from Ontario. If all the cheese manufactured in the province were brought to a similar or even higher standard of excellence, they might go with the name of "Finest Canadian" upon them and bring additional credit to that brand. I know the people of Quebec are enterprising enough, courageous enough, and willing enough to make an effort to manufacture and to send to England, cheese of such quality as will win them a better name than they have hitherto enjoyed, and fetch them a relatively higher price than they have hitherto received."

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## (2.)—Directions for raising fodder corn, &c.

The experience of the season points to the following conclusions in regard to the growth of corn, the construction of silos, and the filling of the same:—

Soil.—If a field with a loose, warm, loamy soil be convenient to the silo, and can be used, it should be selected in preference to heavy clay, or cold soils. Sod may be ploughed under, shortly before the crop is planted, with the probability of good results from the method of preparation. In all cases, the land should receive a liberal dressing of barnyard manure, be ploughed in the spring, and be harrowed to a state of fine tilth before the corn is planted.

Seed.—The vitality and vigour of growth of the variety of corn which has been selected should be tested. The putting of a few grains in a flower pot in a warm place in the house will enable any farmer to verify for himself these qualities in his seed grain. Frequent disappointment results from neglect in testing the vitality of corn before planting it. As a general rule the variety which will yield the largest weight per acre, and reach the 'glazing' stage of maturity before the frosts come, is the one to select for any district. The 'glazing' stage may be otherwise described as the stage when the corn is just past its best condition for boiling in the ear for table use. It is better to err on the side of selecting a variety of a habit of small growth, which certainly will reach the glazing stage, than a variety of large growing habits, which may not come to the desired stage of maturity.

The maximum quantity of seed per acre may be put at 25 pounds; excellent results have been obtained from the planting of 18 to 20 pounds per acre.

Manner of Planting.—Planting in hills, 3 feet apart, both ways, appears to afford the corn a better chance for maturing early, and for producing a large number of ears. A hand corn-planter may be used to dibble in the corn. From 4 to 6 grains per hill should be planted. Corn may also be planted by the use of a hoe, and covered to a depth of at least 2 inches. In that case the foot should be pressed on the soil over the corn. For small areas, furrows 3 inches deep may be ploughed 3 feet apart. A marker (which may be constructed by driving wooden pins or harrow-teeth through a plank at distances of three feet from each other), may be drawn across the furrows. From 4 to 6 grains may be dropped at the points of intersection. They can be covered quickly and well by the planter's foot. For large areas, a single or double horse corn-planter may be used with advantage. The planting of corn in hills affords an opportunity for the effective cleaning of land from weeds, without much hand labour, by permitting cultivation in both directions.

If planted in rows, the rows should be from 3 to 3½ feet apart, and the grains may be put in at rates of 2 to 3 grains per lineal foot. For small plots, a convenient method is to open a furrow with a plough; the seed may be dropped in at the rate already mentioned, when it may be covered. For large areas, a single or double corn-planter will be found a serviceable implement.

Depth.—Corn seed should be planted to a depth of from 2 to 3 inches.

Cultivation.—In cases where a crust forms on the land before or immediately after the corn comes through, a light harrowing will prove very helpful to the vigour and growth of the crop. Harrowing of the corn until it is six inches high will increase the rapidity of growth and the yield per acre. The cultivation between the rows, when the plants are small, should be close to them, and deep. When the plants have grown to a height of more than 3 feet the cultivation should be more distant and shallow, in order to avoid injuring the side roots of the plants.

Silos.—The main features that are required in a silo are strength to resist the outward pressure of its contents, exclusion of air by the construction of the sides, and a fair depth of holding capacity, in order to permit the ensilage to settle into a compact mass. Sufficient strength of sides can be obtained in most silos by the use of 2 x 10-inch or 2 x 12-inch studs, placed from 18 inches to 2 feet apart. A clay or earthen floor is most economical, and as good as any that can be put in. The inside of the walls of the silo may be finished by a single lining of lumber, nailed to the studs horizontally. The lumber should be tongued and grooved and dressed on the inside. If each alternate board be allowed to extend at the corners, so as to make

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a lock-joint, that will give additional strength to the structure. The corners of the silo, on the inside, should be filled by the use of a board or plank 10 inches wide, set on end. The triangular space behind it should be filled with sand or saw-dust, I consider that studs 2 x 10-inch or 2 x 12-inch, with one ply of sound tongued and grooved lumber, nailed horizontally on the inside, are sufficient for an efficient preservation of the ensilage. Additions to that method of construction may be advantageous, in a few cases, for convenience. If a portion of the ensilage around the sides becomes frozen, that is more an inconvenience than a loss. It should be mixed with the warm ensilage, from the middle of the silo, before it is offered or fed to the cattle.

CUTTING THE CORN.—The cutting of fodder corn by hand has been found the most economical of the methods which we have tried. If the crop be allowed to wilt in the fields, until it loses from 15 to 20 per cent of its moisture, a pleasant aromatic odour will be developed, which leaves the ensilage with a more agreeable smell. From an examination which was conducted with two tons of corn, left to wilt in the fields, in small heaps of about twenty-five or thirty stalks each, it was found that, with two days' exposure during bright sunshiny weather, the corn lost 20·5 per cent of its weight; with four days' exposure, 36·8 per cent. After twenty-eight days standing in 'stooks' it had lost 52 per cent; and after five months it had lost 58·8 per cent of its original green weight.

CURING THE CORN.—The crop should be cut in the autumn before there is any risk of frost, which would damage it to some extent, if it came before the cutting was completed. The corn may be cut with a sickle, a reaping-hook or corn-knife. It may be put up in large stooks or stacks in the field or yard. After it is partly dried, it may be stored loosely, with the stalks standing on end in a shed, barn or loft. The stalks should never be laid on their sides in large bulk or they will heat and mould. If the corn be left in the field tied securely at the tops by hay rope, straw rope, or binding twine, it will keep with little waste until later in the fall, when it can be taken to the barnyard, where a contrivance can be made almost as serviceable for a small lot of corn as a silo. It is not a new plan for those who live in western Ontario, but it is new to many of the people in many parts of Canada. It consists in taking a number of forked stakes and driving them into the ground. By laying poles in the forks one can make a simple corn trestle. By laying down a few old rails, like the base for a stack, the corn can be placed on end, leaning against that trestle to the thickness of 2 or 3 feet on both sides. Then ordinary rails or poles can be placed on the outside of the corn, on both sides, lengthwise, the whole being tied near the top of the corn by hay or straw ropes. Then, if a few boards be put on the top and on both sides—allowing them to overlap—they will shed all the rain. The corn stalks can be fed from the end, with very little more waste than when the crop is put in a silo, and the outlay required for stooking or stacking it in that way is simply *nil*. Any man can make a contrivance of that kind in a few hours. I have found that method to be quite successful in past years, and the only risk incurred is, that if one put straw on the rails for a foundation it will become a great harbour for mice; but barring that difficulty, the corn saves well, and most of the waste is a little weathering on the outside stalks.

FILLING THE SILO.—It is advantageous to cut into the silo, those varieties of corn which have thick stalks, in lengths of from ½ to ¾ of an inch. Cut into such lengths there is no waste, and the stalks and cobs are all eaten up clean by the animals. Provision should be made for a fairly even distribution of the corn in the silo, while it is being filled, and for tramping the sides and corners most thoroughly. The weighting of the corn does not appear to be necessary or advantageous. After the silo is filled the surface should be levelled and thoroughly tramped if the corn-stalks and leaves be dry from frost, from ripening or wilting in the field, 30 or 40 gallons of water may be sprinkled on the top of the silo with advantage; and after the lapse of *not more than one day* it should be covered to a depth of 6 inches with cut straw. If a foot of straw be put on the top of that a few days later, probably no loss at all from waste ensilage will be found on the opening of the silo for feeding. The feeding should be effected from the top of the ensilage, and a quantity of the exposed ensilage should be raked from the top daily.

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## (3.)—The Robertson Mixture for Ensilage.

This new mixture is composed of Indian corn, horse beans and the heads of sunflowers. It appears to be a perfect combination which will give cattle a food containing all the nourishment required.

Ensilage has come to mean any kind of fodder which is cured and preserved in a succulent state for the feeding of domestic animals. The silo has no power to add any nutrient to the fodder which is put into it for preservation. Its contents may become more digestible and palatable by the changes which proceed slowly under the action of ferments, or they may become less pleasant and wholesome if fermentation goes too far. Fodder, which is deficient in nutrients before it is put into a silo, will experience no regeneration there. Degeneration into offensive material is the only and constant tendency, and that can be arrested.

Indian corn—the great sun-plant of the continent—is undoubtedly the most serviceable crop which has been used for ensilage; but although it be ever so well preserved as to succulence, odour, flavour and colour it is an incomplete food for cattle. With a marvellous proclivity for storing up starch, gum and sugar out of the elements of the air, the corn-plant becomes a veritable accumulator of sun-strength and energy. Its carbo-hydrates or "heat-producing parts" are largely in excess of its albuminoids or "flesh-forming parts." These latter are present in no mean quantities in fodder corn per acre; but, for a wholesome, economical, complete food, they are out of correct proportion to the other constituents.

A main function of intelligent men on earth seems to be to put and keep things in their right relationships to each other, and therefore the intelligent farmer has been putting carbo-hydrates and albuminoids, in the rations for his cattle, in the right relationships and proportions to each other—even at the expense of his purse. That has been done commonly by adding ripened grain, such as oats, barley, wheat and pease, to the bulky-fodder part of rations, or by buying for that purpose oil-cake, cotton-seed meal, or some other feeding commodity which is rich in albuminoids.

For a few years, I have been seeking to find and put into the silo, with Indian corn, some other plant or plants which would furnish the necessary quantity of albuminoids in a form which would cost very much less than ripened cereals, or concentrated by-products. Clovers and pease have been tried with indifferent success, and the climbing or pole beans have been grown, with cornstalks for trellis, without appreciable advantage.

The horse bean or small field bean (*Faba vulgaris*, var. *equina*) seems to meet the needs of the case. This plant grows with a stiff, erect stem of quadrangular shape. It attains here a height of from three to four feet; and it grows in England and Scotland to a height of from three to six feet. It bears pods from within six or eight inches from the base of the stalk to near its top. The ripened beans are of a grayish-brown colour, and of an oblong, round-shape, about ½ inch long diameter and about ⅜ inch in short diameter.

With us the plants have carried ripened beans in the lower pods, while the topmost ones on the same stalks were hardly out of bloom. By growing the horse beans as a fodder crop, in rows 3 feet apart, with 3 or 4 plants per foot in each row, we obtained an average yield of 6 tons 1,610 pounds per acre of green fodder. Representative samples of the crop were analysed by Mr. Frank T. Shutt, Chief Chemist of the Dominion Experimental Farms, and from his analyses it is established that the horse beans contained 370 pounds of albuminoids and 94 pounds of fat per acre. They were preserved in a silo in a layer by themselves, and also in mixture with Indian corn plants. They were grown also in alternate rows with Indian corn—and moreover, were grown in the same rows with Indian corn—the beans and corn being mixed before they were put into the planter.

Although albuminoids and carbo-hydrates (in the form of starch, gum, sugar and fibre) may be contained in an Indian corn and horse bean mixture in nearly correct proportions, it is still an incomplete food, from deficiency in fat. The sunflower (*Helianthus annuus*) grows luxuriantly over the whole of the temperate zone

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of this continent, and the seeds contain a large percentage of fat. The variety known as the "Mammoth Russian" was grown in rows 3 feet apart, with the plants from 3 to 18 inches distant in the rows. There did not appear to be any appreciable difference in the weight of the crop per acre, where the plants were grown close or more distant in the rows. They yielded at the rate of 7½ tons of sunflower heads per acre. From the analyses made by Mr. Shutt, it was established that they contained 352 pounds of albuminoids and 729 pounds of fat per acre.

The following table shows the quantities of the nutrients which are contained in a crop of the "mixture" from three and a half acres, at estimated yields per acre which are within what have been actually obtained.

| | Albuminoids. | Carbo-hydrates and fibre. | Fat. |
|---|---|---|---|
| | Lbs. | Lbs. | Lbs. |
| Indian corn, 2 acres, say 30 tons | 1,092 | 10,302 | 324 |
| Horse beans, 1 " " 8 " | 435 | 1,210 | 111 |
| Sunflower heads, ½ " " 3¾ " | 176 | 1,186 | 364 |
| Total..... 3½ acres, say 41¼ tons | 1,703 | 12,698 | 799 |

The cattle relished the Indian corn and horse beans ensilage.

A group of milking cows are being fed on a ration, of which the ensilage part is made from mixing the heads of sunflowers from half an acre with Indian corn fodder from two acres. The cows of another similar group are being fed upon a like ration, of which the ensilage part is from Indian corn alone, with 2 lbs. of grain per head per day more than is allowed the cows of the former or sunflower group. The milk from the two groups, is set in deep-setting pails in ice water under the same conditions; and the following results are apparent from an average of nine tests:—

| | From ration with sunflower ensilage. | From ration with ordinary Indian corn ensilage. |
|---|---|---|
| Percentage of fat in skim-milk | 0·35 | 0·51 |
| Churning period, minutes | 30 | 20 |
| Percentage of fat in butter-milk | 0·25 | 0·40 |

The butter from the cows, which are fed on the ration with sunflower ensilage, has a richer flavour and slightly higher colour than that from the other lot.

The sunflower ensilage has developed a most agreeable odour, and the cattle are greedily fond of it.

Besides the points which have been mentioned, it should not be overlooked that horse beans belong to the family of plants which have the faculty of appropriating free nitrogen from the atmosphere for the formation of the albuminoids which they contain. It is possible to increase the fertility of soil rapidly and to a remarkable degree, by growing the crop and feeding it to dairy or fattening stock. Protection to the land and profit to the pockets of the farmers are the two fruits to be expected. These form a capital combination for Canadian farmers, and no personal propriety right restricts the use of it.

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## CIRCULAR OF DIRECTIONS.

### SOIL.

If a field with a drained, warm, loamy soil be convenient to the silo, and can be used, it should be selected in preference to a heavy clay or wet soil for Indian corn. The horse beans do well on clay soils. In all cases, the land will be the better for receiving a liberal dressing of manure. It should be ploughed in the spring, and be harrowed to a state of fine tilth before the seeds are planted.

### TIME TO PLANT.

The time at which Indian corn for fodder may be planted with the best results, is during the last ten days of May, or late enough in the season to escape frosts at night, and early enough to give the plants the advantage of as long a season for growing as is practicable. The horse beans and sunflowers are less liable to injury from frost than Indian corn.

Throughout the province of Ontario and the western portion of the province of Quebec, the horse beans may be planted with advantage from two to three weeks later than the Indian corn. Throughout the Maritime Provinces, they may be planted at or about the same time as the corn.

The sunflowers should be planted as early in the spring as is practicable,—otherwise, the heads may not ripen in time to be put into the silo.

### PROPORTION.

The mixture should contain about 10 tons of Indian corn fodder, to about 3 tons of horse beans, and about 1 ton to 1½ tons of sunflower heads. To obtain it in these proportions, it should be grown at the rate of one-quarter of an acre of sunflowers, and half an acre of horse beans, to every acre of Indian corn.

### HOW TO PLANT.

Throughout the Maritime Provinces and in the eastern part of the province of Quebec, the Indian corn and horse beans may be mixed together and planted in rows 3 feet apart, with from 2 to 4 grains per lineal foot in every row. Elsewhere, a larger crop of bean plants, not too ripe and dry for the silo, may be ensured by planting them separate from the Indian corn.

The Indian corn may be planted in rows 3 feet apart, with from 2 to 3 grains per lineal foot in every row. A horse-power corn-planter or seed drill may be used for that purpose. Or it may be planted in hills 3 feet apart both ways, with from 4 to 6 grains in every hill. A horse-power or hand corn-planter may be used. If neither of these implements and no other suitable planter be available, furrows 3 inches deep may be ploughed 3 feet apart. The seeds may be put in them and covered, after which the field should be rolled.

The horse beans may be sown in rows 3 feet apart, with from 3 to 6 grains per lineal foot in every row. The same machinery or method may be used as for the sowing or planting of the Indian corn.

The sunflower seeds are to be planted by themselves, in rows 3 feet apart. Not more than one plant per lineal foot in the rows should be left to grow. If they come up thicker, they should be thinned out to one plant for every twelve or eighteen inches in the rows.

### PUTTING INTO THE SILO.

To prevent deterioration and decay is the function of the silo; and to that end it should be constructed to exclude the atmosphere. To do so requires the use of building material of adequate strength. The fastening of its parts at the foundation

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and at the corners of the silo should be secure. I have found one ply of sound one-inch lumber, tongued and grooved, nailed horizontally on the inside of studs two inches by ten inches, or two inches by twelve inches, to be sufficient.

When the Indian corn has reached the "glazing" stage of growth, the crop is to be put into the silo without wilting or drying; but if and when it has not reached the "glazing" stage before frost comes, it is to be cut and left to wilt or dry in the field for about one day.

The corn and beans are to be cut in lengths of from ½ inch to 1 inch and put into the silo; and the heads only of sunflowers are to be cut with them. They may be fed through the cutting-box on and with the corn and beans.

A fairly even distribution of the mixture should be made in the silo, while it is being filled. If the leaves and lighter parts are permitted to flutter into one place, and the stalks, ears and heavier portions are allowed to settle by themselves, the ensilage will not keep well.

The mixture is to be tramped thoroughly around the sides and in the corners of the silo.

A thin layer of uncut cornstalks should be put between the "Robertson mixture" and the other contents (if any) of the silo, in order to mark the exact place in the ensilage.

After the silo is filled, the surface should be levelled and thoroughly tramped; and after the lapse of not more than one day, it should be covered to a depth of six inches with cut straw or cheap fodder. If this be tramped occasionally, and a foot of cut straw be put on top of that a few days later, probably no waste ensilage will be found on the opening of the silo for feeding.

### FEEDING THE ENSILAGE.

The "Robertson mixture" is to be fed with 4 pounds less meal or grain per 50 pounds of ensilage, than has been required with ordinary Indian corn ensilage, to make an economical ration for feeding milking cows and fattening cattle.

## (4.)—ON THE CARE OF CHEESE WHEN BEING RETAILED.

When the cut surface of a cheese (not protected by the rind), is exposed to the air, evaporation goes on rapidly, and it soon becomes dry and loses much of its exquisite flavour.

When cheese is being retailed in a shop where one cheese will last the trade for a week or more, a simple, cheap and easy way to prevent loss from that cause, is to lay one-half of the cheese, with its cut surface, on a piece of grease-proof or parchment paper which has been covered with butter of good flavour. One half of the cheese may be left in that position while the other half is being cut up. The cut surface of the cheese should be kept covered as far as possible with grease-proof paper, upon which a thin layer of butter has been spread.

To protect the cheese against the attacks of "skippers" or maggots, it should be placed where flies cannot reach it. That can be done by keeping the cheese in a specially constructed case, with at least two sides of glass and a sliding or hinged door on the inward side of the counter.

If the cheese be handled in the way suggested, less loss of weight will be entailed upon the shop-keeper, the customers will be better pleased with it as a food, and the demand for its consumption will be increased.

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## PART IX.—SUMMARY OF BUSINESS AT THE EXPERIMENTAL DAIRY STATIONS.

*Summary of the Business for the Season* 1892, *at the Dominion Experimental Dairy Station, New Perth, P.E.I.*

The factory was in operation 127 days. Milk was furnished by 143 patrons. The quantity of milk received at the factory was 669,168 lbs. The quantity of cheese manufactured was 63,018 lbs. The average price realized for cheese was 10·12 + cents per lb. The quantity of milk required to make a pound of cheese was 10·61 + lbs. The net value of milk to the patrons was 71·82 + cents per 100 lbs.

| | Lbs. | $ cts. |
|---|---|---|
| Proceeds from sales of cheese:— | | |
| Shipped for Exhibition at Liverpool | 186 | 18 60 |
| do do Chicago | 1,145 | 117 36 |
| Sold to patrons as per Statement No. 1 | 1,927¼ | 204 70 |
| do Milk drawers | 52¾ | 5 64 |
| do New Perth Dairy Company for St. John Relief Fund | 64 | 6 40 |
| do Sundry persons per T. J. Dillon as per Statement No. 2 | 27,072¼ | 2,726 69 |
| Shipped to Great Britain per J. W. Robertson, as per Statement No. 3 | 32,571 | 3,302 59 |
| | 63,018¼ | $6,381 98 |
| Charge for drawing milk and manufacturing cheese—63,018 lbs. at 2½ cents | | 1,575 46 |
| Divided among patrons for milk as per Statement No. 1— | | |
| Cash | $4,138 39 | |
| Charge for manufacturing, etc., after October 15th | 23 24 | |
| Milk-can account paid for patrons | 459 25 | |
| Cheese supplied to patrons | 204 70 | |
| | 4,825 58 | |
| Less—Balances due by patrons | 19 77 | |
| | | 4,805 81 |
| Fractions of cents | | 0 71 |
| | | $6,381 98 |

STATEMENT No. 1, showing the totals of accounts at the Dominion Experimental Dairy Station, New Perth, P.E.I.

| | Total. |
|---|---|
| Milk supplied.....lbs. | 699,168 |
| Value | $4,805 81 |
| Cheese to patrons.....lbs. | 1,927¼ |
| Value | $204 70 |
| Milk cans | $459 25 |
| Charge for manufacturing after Oct. 15, seed, &c | $23 24 |
| Net cash to patrons | $4,138 39 |
| Balance due by patrons | $19 77 |

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STATEMENT No. 2, showing the Quantities and Value of Cheese sold to sundry persons by T. J. Dillon.

| Name. | Cheese. | Amount. | Name. | Cheese. | Amount. |
|---|---|---|---|---|---|
| | Lbs. | $ cts. | | Lbs. | $ cts. |
| | | | Brought forward..... | 7,928½ | 793 00 |
| Benj. Aitken.. ..... | 26 | 2 60 | N. B. & M. Rattenbury. ... | 385 | 38 50 |
| Angus McLean..... ... .. | 62 | 6 20 | Edwin Chay..... | 77½ | 7 75 |
| McDonald Bros. .. ..... | 64 | 6 40 | James Bourke ..... .. ... | 39 | 4 68 |
| Brace & McKay..... . | 611 | 61 10 | Benj. Aitken..... .... | 47 | 5 64 |
| McDonald & Westaway..... | 63 | 6 30 | N. B. & M. Rattenbury..... | 5,268 | 526 80 |
| W. A. Poole & Co. ..... | 62 | 6 20 | McDonald & Westaway..... | 260 | 28 60 |
| John G. Graham ..... ... | 28½ | 3 00 | Mrs. Conners ..... .. .. | 36 | 4 32 |
| James McDonald..... .. . | 54 | 5 40 | James McDonald... ..... . | 252 | 27 42 |
| Montague Stevens. .... .... | 67 | 6 70 | Mrs. Johnston . . . ..... | 64 | 7 68 |
| Angus McLaurin..... | 62 | 6 20 | James Clow..... .. .. .... | 65 | 7 80 |
| Wm. Easton .... .. .. ... | 41 | 4 30 | C. McNeill..... | 65 | 7 80 |
| D. McKay .... .... ..... | 62 | 6 20 | N. B. & M. Rattenbury..... | 6,381 | 638 10 |
| Mrs. Johnston ..... | 62 | 6 00 | Mrs. Johnston..... | 229 | 22 90 |
| Neill Nicholson..... | 190 | 19 00 | Retailed in small amounts .. | 5,975¼ | 605 70 |
| N. B. & M. Rattenbury ..... | 6,474 | 647 40 | | | |
| Carried forward ..... | 7,928½ | 793 00 | Total..... .. . | 27,072¼ | 2,726 69 |

STATEMENT No. 3, showing the proceeds from 506 boxes of Cheese shipped to Great Britain per James W. Robertson, and sold by A. J. Rowson, Esq., 35 Tooley Street, London, S.E., England.

| | Cwt. | Qrs. | Lbs. | s. | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| 103 boxes cheese. .. ..... ..... ... .. | 59 | 1 | 10 | @ 52/6 | 155 | 10 | 8 |
| 115 do ..... .. . .... ..... | 65 | 1 | 18 | @ 53/6 | 174 | 19 | 6 |
| 212 do ..... .. ..... | 120 | 2 | 5 | @ 55/6 | 334 | 10 | 3 |
| 76 do . ... ..... ..... .. ..... | 42 | 0 | 9 | @ 56/ | 117 | 16 | 6 |
| 506 | 287 | 1 | 4 | | 782 | 16 | 11 |

| | £ | s. | d. | | | |
|---|---|---|---|---|---|---|
| 2 months' discount at 5 per cent..... ..... ..... . . . | 6 | 10 | 6 | | | |
| Survey fee on damaged cheese .... ..... ..... | 1 | 1 | 0 | | | |
| Sea water damage—Cheese cut and pilfered ... ..... ..... . . | 1 | 5 | 0 | | | |
| | | | | 8 | 16 | 6 |
| | | | | 774 | 0 | 5 |

| Charges. | £ | s. | d. | | | |
|---|---|---|---|---|---|---|
| Ocean freight . ..... . ..... ..... ... .... | 35 | 4 | 0 | | | |
| Railway freight ..... ..... | 20 | 4 | 9 | | | |
| Receiving, weighing, coopering, delivery, rent, fire insurance, &c .... .... | 6 | 6 | 6 | | | |
| Commission and guarantee, 4 per cent..... | 31 | 6 | 3 | | | |
| | | | | 93 | 1 | 6 |
| Total net proceeds ... ..... ..... ..... ..... | | | | £ 680 | 18 | 11 |

Exchange at $4.85 = $3,302.59

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*Summary of Business for the Season* 1892-93, *at the Mount Elgin Winter Dairy Station.*

The Station was in operation from November 25th to April 1st.
Milk was furnished by 95 patrons.
The quantity of milk received at the Station was 497,274 lbs.
The quantity of butter manufactured was 23,798 lbs.
The quantity of milk required to make a pound of butter was 20·89 lbs.
The average net price realized for butter was 22·84 cents per lb.
The net value to the patrons was 94·96 cents per 100 lbs. milk.

*Proceeds from Sale of Butter.*

| | lbs. | $ cts. |
|---|---|---|
| Sold to sundry persons as per T. J. Dillon | 5,200 | 1,220 82 |
| do do per Jas. W. Robertson | 100 | 24 00 |
| Shipped to Montreal per Thos. Shaw, as per statement No. 1. | 3,050 | 663 21 |
| do Great Britain per Jas. W. Robertson as per Statement No. 2 | 2,808 | 547 56 |
| Sold to Fitzgerald, Scandrett & Co | 8,492 | 2,038 58 |
| do Patrons | 4,148 | 947 56 |
| Butter milk | | 2 00 |
| | 23,798 | $ 5,443 73 |
| Charge for manufacturing butter.....23,798 lbs. @ 3c. per lb. | | $ 713 94 |
| Divided among patrons, in butter | | 947 56 |
| do do in cash | | 3,825 43 |
| | | 5,486 93 |
| Balances due by patrons | | 43 20 |
| | | $ 5,443 73 |

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STATEMENT No. 1, showing the Account Sales of 51 Tubs Butter sold by Thomas Shaw, Esq., Montreal, Que.

| 1893. | Tubs. | | $ cts. | $ cts. |
|---|---|---|---|---|
| April 26.... | 2 | 98 lbs. at 24c | 23 52 | |
| | 12 | 588 do 23¾c | 139 65 | |
| | 11 | 539 do 23½c | 126 67 | |
| | 1 | 49 do 23¼c | 11 39 | |
| | 4 | 196 do 23c | 45 08 | |
| | 30 | 1,470 | 346 31 | |
| | | *Charges.* | | |
| | | Freight $ 10 31 | | |
| | | Commission, 4 per cent 13 85 | 24 16 | |
| | | | | 322 15 |
| May 2.... | 21 | 599 lbs. at 24c | 143 76 | |
| | 2 | 100 do 23¾c | 23 75 | |
| | 12 | 600 do 23½c | 141 00 | |
| | 5 | 250 do 23c | 57 50 | |
| | 31 | 1,549 | 366 01 | |
| | | *Charges.* | | |
| | | Freight $ 10 31 | | |
| | | Commission, 4 per cent 14 64 | 24 95 | |
| | | | | 341 06 |
| | | | | $ 663 21 |

STATEMENT, No. 2 showing the proceeds from 162 tubs of butter shipped to Great Britain and sold by Messrs. Andrew Clement & Son, Glasgow, and by John T. Warrington, jr., Esq., Belleville, Ont.

The following note was sent to the patrons of the Dairy Stations at Mount Elgin, Woodstock and Wellman's Corners at the time when the final payments for the season were made to them under date May 4th, 1893.

NOTES.—Full account sales of the butter shipped to Great Britain have not been received. Sales have been reported at 102s. per cwt. The Dairy Commissioner will be absent on official business in the Maritime Provinces until near the end of May; and rather than delay the settlement with the patrons, the accounts have been made up on that basis, leaving the adjustment of any small balances to be arranged, after the full account of sales have been received.

The account sales referred to are as follows:—

Account Sales of 54 Tubs of Butter sold by Messrs. Andrew Clement & Son, Glasgow, Scotland.

| 1893. | | Cwt. | Qrs. | Lbs. | | £ | s. | d. | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| April 29.. | 29 tubs of butter | 12 | 3 | 21 | at 98s | 63 | 7 | 10 | | | |
| | 17 do | 7 | 2 | 10 | at 96s | 36 | 8 | 6 | | | |
| | 8 do | 3 | 2 | 8 | at 92s | 16 | 8 | 6 | | | |
| | 54 | 24 | 0 | 11 | | | | | 116 | 4 | 10 |
| | *Charges.* | | | | | | | | | | |
| | Freight and charges | | | | | 3 | 10 | 7 | | | |
| | Carriages and cartages | | | | | 2 | 8 | 10 | | | |
| | Discounts | | | | | 1 | 18 | 8 | | | |
| | Commission and guarantee, 3 per cent | | | | | 3 | 9 | 8 | | | |
| | | | | | | | | | 11 | 7 | 9 |
| | | | | | | | | | 104 | 17 | 1 |

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The information upon which I based the statement made in the note to the patrons that "sales have been reported at 102 shillings per cwt." was contained in a letter from A. Clement, Esq., under date of 19th April, 1893. It says, "your last shipment of butter arrived all right; as Manchester was a better market than ours we sent it there and have advice that they sold half of it when it arrived, and will likely clear it out this week. Butter market has been very bad but they expect to make 102 shillings for it."

ACCOUNT Sales of 108 Tubs of Butter shipped by T. J. Warrington, Jun., Esq., Belleville, Ont., and sold on account of Jas. W. Robertson in Great Britain.

| 1893. | | | Cwt. | Qrs. | Lbs. | | £ | s. | d. | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| May 31.. | 10 tubs of butter | | 4 | 2 | 16 | at 90s.. | 20 | 17 | 10 | | | |
| | 5 do | | 2 | 1 | 4 | at 90s.. | 10 | 5 | 8 | | | |
| | 6 do | | 2 | 3 | 2 | at 88s.. | 12 | 3 | 7 | | | |
| | 6 do | | 2 | 3 | 2 | at 88s.. | 12 | 3 | 7 | | | |
| | | | 12 | 1 | 24 | | | | | 55 | 10 | 8 |
| | 27 do | | 12 | 0 | 17 | at 85s.. | 51 | 12 | 11 | 51 | 12 | 11 |
| | 27 do | | 12 | 1 | 5 | at 85s.. | 52 | 5 | 0 | 52 | 5 | 0 |
| | 5 do | | 2 | 1 | 6 | at 78s.. | 8 | 19 | 8 | | | |
| | 1 do | | 0 | 2 | 0 | at 84s.. | 2 | 2 | 0 | | | |
| | 15 do | | 6 | 3 | 9 | at 82s.. | 28 | 0 | 1 | | | |
| | 6 do | | 2 | 2 | 26 | at 78s.. | 10 | 13 | 1 | | | |
| | 108 | | | | | | | | | 49 | 14 | 10 |
| | | | | | | | | | | 209 | 3 | 5 |
| | | *Charges.* | | | | | | | | | | |
| | Dock and town dues | | | | | | 0 | 10 | 5 | | | |
| | Freight and master porterage | | | | | | 6 | 16 | 3 | | | |
| | Carriage to Manchester | | | | | | 1 | 7 | 1 | | | |
| | Bank Commission, &c | | | | | | 2 | 3 | 7 | | | |
| | Commission and guarantee, 5 per cent | | | | | | 10 | 9 | 2 | | | |
| | | | | | | | | | | 21 | 6 | 6 |
| | | | | | | | | | | 187 | 16 | 11 |
| | By 32 days' interest | | | | | | | | | 0 | 16 | 6 |
| | | | | | | | | | | 188 | 13 | 5 |
| | | | | | | | | | | $ | cts. | |
| | Net proceeds from 54 tubs per A. Clement & Son | | | | | | 104 | 17 | 1 | 497 | 98 | |
| | Net proceeds from 108 tubs per John T. Warrington, jun | | | | | | £188 | 13 | 5 | 911 | 90 | |
| | Contributed by Jas. W. Robertson | | | | | | | | | 207 | 76 | |
| | | | | | | | | | | $1,617 | 64 | |
| | Paid to patrons at Mt. Elgin | | | | | | | | | 547 | 56 | |
| | do Woodstock | | | | | | | | | 547 | 56 | |
| | do Wellman's Corners | | | | | | | | | 547 | 56 | |
| | | | | | | | | | | 1,642 | 68 | |
| | Overpaid the patrons | | | | | | | | | 25 | 04 | |
| | | | | | | | | | | $1,617 | 64 | |

SUMMARY OF BUSINESS FOR THE SEASON 1892–93, AT THE WOODSTOCK WINTER DAIRY STATION.

The Station was in operation from November 16th to March 31st.
Milk was furnished by 57 patrons.
The quantity of milk received at the Station was 345,226 lbs.
The quantity of butter manufactured was 15,120 lbs.
The quantity of milk required to make a pound of butter was 22·83 + lbs.
The average net price realized for butter was 22·75 + cents per lb.
The net value to the patrons was 86·53 + cents per 100 lbs. of milk.



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*Proceeds from Sales of Butter.*

| | lbs. | $ cts. |
|---|---|---|
| Sold to sundry persons per J. A. Ruddick | 3,223 | 777 53 |
| do do per J. W. Robertson | 30 | 7 20 |
| do Fitzgerald, Scandrett & Co | 4,612 | 1,106 88 |
| Shipped to Montreal per Thos. Shaw as per statement No. 1 | 2,500 | 560 64 |
| do Great Britain per Jas. W. Robertson, as per Statement No. 2 (Mount Elgin) | 2,808 | 547 56 |
| Sold to patrons | 1,947 | 443 07 |
| | 15,120 | 3,440 88 |
| Charge for manufacturing butter.. 15,120 lbs @ 3cts per lb. | | $ 453 60 |
| Divided among patrons, in butter | | 443 07 |
| do in cash | | 2,550 92 |
| | | 3,447 59 |
| Balances due by patrons | | 6 71 |
| | | $3,440 88 |

STATEMENT No. 1, showing the Account Sales of 50 Tubs of Butter sold by Thomas Shaw, Esq., Montreal, Que.

| 1893. | | Lbs. | $ cts. | $ cts. |
|---|---|---|---|---|
| April 26.. | 6 tubs of butter | 300 at 25c | 75 00 | |
| | 5 do | 250 at 24½c | 61 25 | |
| | 7 do | 350 at 24c | 84 00 | |
| | 5 do | 250 at 23½c | 58 75 | |
| | 2 do | 100 at 23c | 23 00 | |
| | 25 | 1,250 | 302 00 | |
| | *Charges.* | | | |
| | Freight $8 8 19 | | | |
| | Commission, 4 per cent 12 08 | | 20 27 | |
| | | | | 281 73 |
| | 2 tubs of butter | 100 at 25c | 25 00 | |
| | 5 do | 250 at 24½c | 61 25 | |
| | 9 do | 450 at 24c | 108 00 | |
| | 5 do | 250 at 23½c | 58 75 | |
| | 4 do | 200 at 23 | 46 00 | |
| | 25 | 1,250 | 299 00 | |
| | *Charges.* | | | |
| | Freight $8 8 13 | | | |
| | Commission, 4 per cent 11 96 | | 20 09 | |
| | | | | 278 91 |
| | | | | $560 64 |

SUMMARY OF BUSINESS FOR THE SEASON 1892–93, AT THE WELLMAN'S CORNER WINTER DAIRY STATION.

The Station was in operation from November 23rd to March 31st.
Milk was furnished by 62 patrons.
The quantity of milk received at the Station was 302,728 lbs.
The quantity of butter manufactured was 14,037 lbs.
The quantity of milk required to make a pound of butter was 21·70 lbs.
The average net price realized for butter was 22·89 cents per lb.
The net value to the patrons was 89·91 + cents per 100 lbs. milk.

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*Proceeds from Sales of Butter.*

| | lbs. | $ cts. |
|---|---|---|
| Sold to sundry persons, as per J. B. McEwan | 2,365 | 569 50 |
| do Fitzgerald, Scandrett & Co | 5,616 | 1,347 84 |
| Shipped to Montreal, per Thos. Shaw, as per Statement No. 1. | 1,612 | 374 00 |
| do Great Britain, per Jas. W. Robertson, as per Statement No. 2 (Mount Elgin) | 2,808 | 547 56 |
| Sold to patrons | 1,636 | 374 51 |
| Butter-milk sold | | 23 82 |
| | 14,037 | 3,237 23 |
| Charge for manufacturing butter....14,037 lbs, @ 3½c. per lb. | | $ 491 29 |
| Divided among patrons in butter | | 374 51 |
| do in cash | | 2,385 48 |
| | | 3,251 28 |
| Balances due by patrons | | 14 05 |
| | | $3,237 23 |

STATEMENT No. 1, showing the Account Sales of 31 Tubs of Butter sold by Thomas Shaw, Esq., Montreal, Que.

| 1893. | | | $ cts. | $ cts. |
|---|---|---|---|---|
| March 25... | 5 tubs, 260 lbs., at 25½c | | 66 30 | |
| | 12 " 624 " at 25c | | 156 00 | |
| | 3 " 156 " at 23½c | | 36 66 | |
| | 20 " 1040 " | | 258 96 | |
| | *Charges.* | | | |
| | Freight | $5 43 | | |
| | Commission, 4 per cent | 10 36 | | |
| | | | 15 79 | |
| | | | | 243 17 |
| April 13 ... | 3 tubs, 156 lbs., at 24½c | | 38 22 | |
| | 7 " 364 " at 24½c | | 88 27 | |
| | 1 " 52 " at 24c | | 12 48 | |
| | 11 " 572 " | | 138 97 | |
| | *Charges.* | | | |
| | Freight | $2 58 | | |
| | Commission, 4 per cent | 5 56 | | |
| | | | 8 14 | |
| | | | | 130 83 |
| | | | | 374 00 |



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## Summary of Business for the Season 1892–93, at the London, Ont., Winter Dairy Station.

The Station was in operation from November to April.
Milk was furnished by 22 patrons.
The quantity of milk received at the Station was 122,370 lbs.
The quantity of butter manufactured was 5,563 lbs.
The quantity of milk required to make a pound of butter was 21·99 lbs.
The average net price realized for butter was 23·95 + cents per lb.
The net value to the patrons was 93 + cents per 100 lbs of milk.

*Proceeds from Sales of Butter.*

| | lbs. | $ cts. |
|---|---|---|
| Sold to sundry persons per C. C. Macdonald | 4,870 | 1,180 97 |
| Loss by reprinting | 60 | ..... |
| Sold to patrons | 633 | 151 92 |
| | 5,563 | $1,332 89 |
| Charge for manufacturing butter 5,563 lbs @ 3½c. per lb | | $194 70 |
| Divided among patrons, in butter | | 151 92 |
| do in cash | | 997 58 |
| | | $1,344 20 |
| Balance due by patrons | | 11 31 |
| | | $1,332 89 |

## Summary of Business for 1892, at the Dominion Experimental Dairy Station, Kingsclear, N.B.

The Station was in operation from June 14th to Oct. 31st.
Cream was furnished by 64 patrons.
The quantity of cream received at the Station was 28,756·9 inches.
The quantity of butter manufactured was 23,691·7 pounds.
The quantity of cream required to make one pound of butter was 1·22 + inches.
The average net price realised for butter was 19·594 cents per pound.
Proceeds from sales of 399 tubs butter shipped to Great Britain and sold per,—

| | | | |
|---|---|---|---|
| A. Clement & Son, as per Statement No. 1 | 4,550 | pounds | $ 760 10 |
| A. J. Rowson, " 2 | 9,255 | " | 1,684 76 |
| Hodgson Bros., " 3 | 4,200 | " | 900 36 |
| Jas. W. Robertson, " 4 | 1,950 | " | 369 52 |
| Some freight charges, etc., in Great Britain paid by Department of Agriculture | | | 67 10 |
| | 19,955 | | $ 3,781 84 |
| Liverpool Exhibition | 50 | " | 9 37 |
| Sundry persons at 22½ cents per pound | 2,472 | " | 556 20 |
| " at 25 " | 216 | " | 54 00 |
| Patrons at 16·09 + per pound, plus 3½ cents per pound for manufacturing | 899 | " | 176 15 |
| Shrinkage on butter repacked | 99·7 | " | ..... |
| Proceeds from buttermilk | ..... | " | 64 63 |
| | 23,691·7 | " | $ 4,642 19 |

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| | | |
|---|---|---|
| Divided among patrons; Cash | | $ 3,418 23 |
| Butter | | 144 69 |
| Manufacturing charge, 899 lbs. at 3½ cents. | | 31 46 |
| " 22,792·7 lbs. at 4½ cents. | | 1,025 67 |
| Balance due patrons | | 22 14 |
| | | $ 4,642 19 |

STATEMENT No. 1, showing proceeds from sales of 91 tubs of butter.

*By A. Clement & Sons, Glasgow and Manchester.*

| | | | | | | | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|
| 4 | tubs butter | 1 cwt. | 3 qr. | 4 lbs. | @ 116s. | per cwt. | 10 | 7 | 2 |
| 5 | " | 2 | 0 | 22 | @ 112 | " | 12 | 6 | 0 |
| 3 | " | 1 | 1 | 10 | @ 109 | " | 7 | 6 | 1 |
| 2 | " | 0 | 3 | 16 | @ 104 | " | 4 | 12 | 10 |
| 12 | " | 5 | 1 | 12 | @ 100 | " | 26 | 15 | 8 |
| 1 | " | 0 | 1 | 21 | @ 98 | " | 2 | 2 | 10 |
| 4 | " | 1 | 3 | 4 | @ 90 | " | 8 | 0 | 8 |
| 10 | " | 4 | 1 | 9 | @ 88 | " | 19 | 1 | 0 |
| 10 | " | 4 | 1 | 16 | @ 86 | " | 18 | 17 | 9 |
| 4 | " | 1 | 3 | 4 | @ 75 | " | 6 | 13 | 11 |
| 36 | " | 16 | 0 | 8 | @ 70 | " | 56 | 5 | 0 |
| 91 | | | | | | | £172 | 8 | 11 |

*Charges:—*

| | £ | s. | d. | | | |
|---|---|---|---|---|---|---|
| Carriage—London to Manchester | 3 | 1 | 10 | | | |
| London to Glasgow | 2 | 2 | 9 | | | |
| Bristol to Manchester | 0 | 16 | 6 | | | |
| | £6 | 1 | 1 | | | |
| Discounts | 2 | 17 | 4 | | | |
| Commission and guarantee 3 per cent | 5 | 3 | 5 | | | |
| | | | | 14 | 1 | 10 |
| £158 7s. 1d. = $760.10 | | | | £158 | 7 | 1 |

STATEMENT No. 2, showing proceeds from sales of 185 tubs of Butter.

*By A. J. Rowson, 35 Tooley St., London, S.E., England.*

| | | | | | | | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|
| 44 | tubs butter | 19cwt. | 0qr. | 9lbs. | @ 94s. | per cwt. | 89 | 13 | 7 |
| 28 | " | 12 | 0 | 22 | @ 100 | " | 60 | 19 | 7 |
| 1 | " | 0 | 1 | 21½ | @ 116 | " | 2 | 11 | 3 |
| 1 | " | 0 | 1 | 20½ | @ 108 | " | 2 | 6 | 9 |
| 5 | " | 2 | 0 | 21 | @ 103 | " | 11 | 5 | 4 |
| 30 | " | 13 | 0 | 14 | @ 106 | " | 69 | 11 | 3 |
| 28 | " | 12 | 1 | 19 | @ 102 | " | 63 | 6 | 10 |
| 1 | " | 0 | 1 | 12 | @ 112 | " | 2 | 10 | 0 |
| 35 | " | 15 | 2 | 2 | @ 105 | " | 81 | 9 | 4 |
| 12 | " | 5 | 1 | 12 | @ 112 | " | 30 | 0 | 0 |
| 185 | | | | | | | £413 | 13 | 11 |
| 2 months' discount, 5 per cent | | | | | | | 3 | 8 | 10 |
| Carried forward | | | | | | | £410 | 5 | 1 |

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| | £ | s. | d. |
|---|---|---|---|
| Brought forward | 410 | 5 | 1 |

*Charges:—*

| | £ | s. | d. |
|---|---|---|---|
| Ocean freight, &c | 17 | 12 | 0 |
| Dock dues, landing, &c | 6 | 15 | 2 |
| * Receiving, weighing, coopering, &c. | 4 | 19 | 9 |
| Special storage, 4 weeks @ £2 2s. | 8 | 8 | 0 |
| Commission and guarantee, 4 p.c. | 16 | 10 | 4 |
| Loss of commission on 214 tubs | 5 | 0 | 0 |
| | | 59 | 5 | 3 |
| £350 19s. 10d. = $1,684.76. | £350 | 19 | 10 |

Exchange was calculated at $4.80 to the £; actual exchange when remittance was received and placed to credit of Receiver General was $4.86+, netting $1,706.21.

STATEMENT No. 3, showing proceeds from sales of 84 tubs of Butter.

*By Hodgson Bros., Liverpool, England.*

| | | | | | | | | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | tubs butter | 4 | cwt. | 1 | qr. | 16 | lbs. @ 113s. 6d. per cwt. | 24 | 18 | 7 |
| 15 | " | 6 | | 2 | | 18 | @ | 37 | 16 | 0 |
| 15 | " | 6 | | 2 | | 8 | @ 108 " | 35 | 9 | 9 |
| 10 | " | 4 | | 1 | | 21 | @ 102 " | 22 | 12 | 8 |
| 5 | " | 2 | | 0 | | 22 | @ 113 " | 12 | 8 | 2 |
| 10 | " | 4 | | 1 | | 16 | @ 112 " | 24 | 12 | 0 |
| 10 | " | 4 | | 1 | | 17 | @ 106 " | 23 | 6 | 7 |
| 9 | " | 3 | | 3 | | 22 | @ 100 " | 19 | 14 | 8 |
| 84 | | | | | | | | £200 | 18 | 5 |
| | Discount | | | | | | | 1 | 17 | 8 |
| | | | | | | | | £199 | 0 | 9 |

*Charges:—*

| | £ | s. | d. |
|---|---|---|---|
| Carriage, warehouse, &c. | 2 | 0 | 0 |
| Commission and guarantee, 4 p.c. | 8 | 0 | 9 |
| Brokerage | 0 | 4 | 4 |
| Carriage from London | 2 | 18 | 6 |
| | | 13 | 3 | 7 |
| £185 17s. 2d. = $900.36 | £185 | 17 | 2 |

STATEMENT No. 4, showing proceeds from sales of 39 tubs of Butter per Jas. W. Robertson.

39 tubs, weighing 1,950 lbs. = $369.52.

NOTE.—The 39 tubs were the balance of the shipment; in the expectation of obtaining a better price, they were held through February and March; the market did not improve while the butter deteriorated in quality. Some of it was ultimately sold as low as 65s. per cwt. In view of these circumstances, the Dairy Commissioner took it on his own account and made up the amount required to bring it equal to the average price of the other 360 tubs of the shipment.

* On the whole shipment of 399 tubs of butter.

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ACCOUNT Sales of 39 Tubs Butter sold by Messrs. Hodgson Bros., Liverpool, England.

| Tubs. | Cwt. | qr. | lbs. | | £ s. d. | £ s. d. |
|---|---|---|---|---|---|---|
| 10, | 4 | 1 | 26, | at 75s. | 16 16 2 | |
| 5, | 2 | 1 | 5, | at 70s. | 8 0 8 | |
| 5, | 2 | 1 | 3, | at 68s. | 7 14 10 | |
| 6, | 2 | 2 | 15, | at 65s. | 8 11 2 | |
| 3, | 1 | 1 | 8, | at 90s. | 5 18 11 | |
| 5, | 2 | 0 | 21, | at 65s. | 7 2 2 | |
| 5, | 2 | 0 | 20, | at 65s. | 7 1 7 | |
| 39 | 17 | 1 | 14 | | | 61 5 6 |
| | | | | *Charges.* | | |
| | | | | Carriage from Manchester | 0 12 7 | |
| | | | | Cartage, 4s. 11d.; porterage, 6s. 6d.; warehousing, 4s. 11d.; insurance, 1s. 6d. | 0 17 10 | |
| | | | | Two months' discount | 0 10 2 | |
| | | | | Commission and guarantee | 3 1 3 | 5 1 10 |
| | | | | Net proceeds | | 56 3 8 |
| | | | | £56 3s. 8d. = $269 68 | | |
| | | | | Contributed by Jas. W. Robertson | 99 84 | |
| | | | | | $369 52 | |

SUMMARY OF BUSINESS FOR THE SEASON 1892-93 AT THE SUSSEX, N.B., WINTER DAIRY STATION.

The Station was in operation from November 7 to April 17.
Milk was furnished by 24 patrons.
The quantity of milk received at the Station was 150,513 lbs.
The quantity of butter manufactured was 6,496 + lbs.
The quantity of milk required to make a pound of butter was 23·13 lbs.
The average net price realized for butter was 23·62 + cents per lb.
The net value to the patrons was 85·5 cents per 100 lbs. of milk, plus the skim-milk returned.

PROCEEDS FROM SALES OF BUTTER.

| | lbs. | $ cts. |
|---|---|---|
| Sold to sundry persons per J. W. Hart | 6,391 | 1,509 74 |
| do patrons | 105 | 24 40 |
| From buttermilk | | 9 59 |
| | 6,496 | $ 1,543 73 |
| Charge for manufacturing butter 6,496 lbs. @ 3½ c. per lb | | $ 227 36 |
| Divided among patrons, butter | | 24 40 |
| Cash | | 1,287 01 |
| Small balances (added to amount retained for manufacturing charge) | | 4 96 |
| | | $ 1,543 73 |

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## DAIRYING, STOCK ACCOUNT.

| | No. of Boxes. | No. of Pounds. | Price. |
|---|---|---|---|
| | | | $ cts. |
| **Purchases of cheese, 1891-92** | | | |
| Perth, Ont. | 267 | 16,603 | 1,627 60 |
| London, Ont. | 376 | 24,418 | 2,521 49 |
| Dunham, Que. | 306 | 20,095 | 2,002 23 |
| Manitoba | 33 | 1,939 | 203 60 |
| New Brunswick | 166 | 10,105 | 1,004 82 |
| Nova Scotia | 100 | 6,441 | 624 78 |
| Sundry places | 40 | 2,630 | 249 61 |
| | 1,288 | 82,231 | 8,234 13 |
| **Sales of cheese, 1891-92** | | | |
| A. Clement & Son, Glasgow | 1,172 | 73,534 | 7,447 91 |
| Thos. Shaw, Montreal | 86 | 5,082 | 399 83 |
| Bate & Co., Ottawa | 10 | 544 | 57 12 |
| Balance on hand, June 30, 1892 | 20 | 1,088 | ..... |
| Accounted for by shrinkage | ..... | 1,983 | ..... |
| | 1,288 | 82,231 | 7,904 86 |
| **Purchase and make of cheese, 1892-93** | | | |
| Balance on hand, June 30, 1892 | 20 | 1,088 | ..... |
| C. A. Matheson, Perth | 1,476 | 109,366 | 10,550 28 |
| L. C. Archibald & Co. | 3 | 220 | 19 80 |
| W. F. Gerow | 3 | 201 | 18 09 |
| Alex. W. Grant | 5 | 314 | 30 61 |
| A. Macfarlane | 57 | 3,967 | 376 87 |
| C. L. Tilley & Son | 6 | 367 | 34 86 |
| A. A. Ayer & Co. | 9 | 723 | 68 69 |
| New Perth Dairy Station, shipped | 527 | 33,902 | ..... |
| do do sold locally* | ..... | 27,136½ | ..... |
| | 2,106 | 177,284½ | 11,099 20 |
| **Sales of cheese, 1892-93** | | | |
| By A. J. Rowson, London, Eng., as per Statement No. 3 of New Perth Dairy Station, and per account sales No. 1 hereafter | 753 | 49,239 | 5,159 65 |
| By A. Callender & Co., Liverpool, as per account sales Nos. 2 and 3 hereafter | 549 | 41,674 | 4,169 68 |
| By A. Clement & Son, Glasgow, as per account sales No. 4 hereafter | 167 | 10,491 | 1,091 47 |
| By Hodgson Bros., Liverpool, as per account sales No. 5 hereafter | 525 | 36,780 | 3,599 64 |
| Thomas Shaw, Montreal | 28 | 1,938 | 185 73 |
| A. F. MacLaren, Windsor, Ont. | 2 | 144 | 14 40 |
| A. A. Ayer & Co., Montreal | 6 | 380 | 29 45 |
| By T. J. Dillon, as per Statement No. 2 of New Perth Dairy Station, P.E.I. | ..... | 27,072½ | 2,726 69 |
| New Perth Dairying Company | ..... | 64 | 6 40 |
| To World's Fair account | 28 | 1,840 | 188 60 |
| At Experimental Farm, Ottawa | 8 | 402 | 42 21 |
| | 2,066 | 170,024½ | 17,213 92 |
| By A. J. Rowson, not yet paid for (from Imperial Institute) | 5 | 314 | ..... |
| By A. Clement & Son (not yet paid for), as per account sales No. 6 hereafter | 30 | 2,250 | ..... |
| Given away in Great Britain to pressmen and others | 4 | 266 | ..... |
| Given away at Experimental Farm, Ottawa, on occasion of farmers' excursions | 1 | 51 | ..... |
| Accounted for by shrinkage† | ..... | 4,379 | ..... |
| | 2,106 | 177,284½ | ..... |

*There were sold to the patrons and milk drawers at New Perth 1,980 lbs. for $210.34, which amount was deducted from the balances due them when the final settlement was made.

†The original weight of the cheese was taken when they were from 15 to 30 days old. There was a shrinkage in weight during the time the cheese were held for examination in store and in the experimental curing room; then there was the shrinkage on the shipments to Great Britain before they were sold there.

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## No. 1.—Cheese from Perth Dairy Station, Ont. (C. A. Matheson, Esq.)

**Account Sales 250 Boxes Cheese sold for Jas. W. Robertson, Ottawa, ex ss. "Brazilian" 22nd November, 1892, by A. J. Rowson, London, Eng.**

| 1893. | | £ s. d. | £ s. d. |
|---|---|---|---|
| | Boxes. Cwt. qr. lbs. | | |
| Jan. 14..... | Ex. 30 247 151 2 0 at 56s..... | ..... | 424 4 0 |
| | 3 given away. | | |
| | 250 | | |
| | Less 3 months' discount at 5 p.c ..... | ..... | 5 6 0 |
| | | | 418 18 0 |
| | *Charges.* | | |
| | Freight, dock, landing and delivery charges..... | 19 11 4 | |
| | Receiving, weighing, coopering, delivering, rent, insurance, &c.... | 3 2 6 | |
| | Commission and guarantee, 4 p.c..... | 16 19 4 | |
| | | | 39 13 2 |
| | Net proceeds..... | ..... | 379 4 10 |

## No. 2.—Cheese from Perth Dairy Station, Ont. (C. A. Matheson, Esq.)

**Account Sales of 528 boxes Cheese, ex ss. "Numidian," sold for account of Jas. W. Robertson, Ottawa, by Andrew Callender & Co., Liverpool.**

| 1893. | | £ s. d. | £ s. d. |
|---|---|---|---|
| | Boxes. Ex. Cwt. qr. lb. | | |
| Jan. 4..... | By sale 190 34 131 2 21 at 50s..... | ..... | 329 4 5 |
| | do 165 35 116 0 4 at 50s ..... | ..... | 290 1 9 |
| | do 173 36 110 2 19 at 52s..... | ..... | 287 14 10 |
| | 528 358 1 16 | | 907 1 0 |
| | Less 2 months' interest..... | ..... | 7 11 2 |
| | | | 899 9 10 |
| | *Charges.* | | |
| | Freight on 416 cwt. 2 qr. 6 lbs. at 40·85 cents per 100 lbs..... | 39 14 2 | |
| | Master Porterage ..... | 1 18 3 | |
| | Entry dock and town dues..... | 1 10 0 | |
| | Attending ship, carting, receiving, storing, opening and showing, weighing, coopering and delivering..... | 7 10 6 | |
| | Rent, 98s. 4d. ; fire insurance, 40s.. ..... | 6 18 4 | |
| | Interest on charges..... | 0 12 6 | |
| | Bank commission..... | 1 0 6 | |
| | Brokerage and guarantee, 2 p.c..... | 18 2 10 | |
| | | | 77 7 1 |
| | Net proceeds due 14th January, 1893..... | ..... | 822 2 9 |
| | Liverpool, 18th January, 1893. | | |

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## No. 3.—Cheese from Liverpool Exhibition.

### Account Sales of 21 Boxes Cheese ex ss. "Sardinian," sold for J. W. Robertson, Ottawa, by Andrew Callender & Co., Liverpool.

| 1892. | Boxes. | | Cwt. | qr. | lbs. | | £ s. d. | £ s. d. |
|---|---|---|---|---|---|---|---|---|
| Aug. 9 | By sale 3 | Canadian Factory, No. 1, wg. | 2 | 1 | 7 | at 48s. | | 5 11 0 |
| | do 3 | The Glen | 1 | 2 | 18 | at 48s. | | 3 19 9 |
| | do 3 | Ex. 10. | 1 | 2 | 22 | at 48s. | | 4 1 5 |
| | do 3 | Palace Rd. Cheese Factory | 1 | 3 | 5 | at 48s. | | 4 6 2 |
| | do 3 | Empey | 2 | 2 | 18 | at 48s. | | 6 7 9 |
| | do 3 | Empress Queen | 1 | 3 | 17 | at 48s. | | 4 11 3 |
| | do 3 | Empress | 1 | 2 | 19 | at 48s. | | 4 .. 2 |
| | 21 | | 13 | 2 | 22 | | | 32 17 6 |
| | Less 2 months' interest | | | | | | | 0 5 6 |
| | | | | | | | | 32 12 0 |
| | *Charges.* | | | | | | | |
| | Freight on 16 cwt. 0 qrs. 17 lbs. at 25s. per ton | | | | | | 1 0 2 | |
| | Master Porterage | | | | | | 0 1 6 | |
| | Entry dock and town dues | | | | | | 0 2 6 | |
| | Attending shipment, carting, receiving and storing, opening and showing, warehousing, coopering, and delivering, cartage to and from show, and expenses attending same, etc | | | | | | 1 10 0 | |
| | Rent, 1s. 5d.; fire insurance, 1s | | | | | | 0 2 5 | |
| | Brokerage and guarantee, 2 p. c | | | | | | 0 13 2 | |
| | | | | | | | | 3 9 9 |
| | Net proceeds due 19th August, 1892 | | | | | | | 29 2 3 |
| | Liverpool, 20th August, 1892. | | | | | | | |

## No. 4.—Cheese from Experimental Curing-room, C.E. Farm, Ottawa.

### Account Sales of 167 Boxes Cheese sold for J. W. Robertson, Ottawa, by Andrew Clement & Son., Manchester.

| 1893. | | | Cwt. | qr. | lbs. | | £ s. d. | £ s. d. |
|---|---|---|---|---|---|---|---|---|
| June 14. | 20 | Ex. 2, | 9 4 | 2 | 10 | at 48s | | 11 0 3 |
| | | | 11 5 | 1 | 17 | at 44s | | 11 17 8 |
| | 13 | Ex. 71 | 7 | 1 | 12 | at 53s | | 19 9 11 |
| | 52 | L. 73, | 22 12 | 3 | 9 | at 55s | | 35 5 8 |
| | | | 30 17 | 2 | 16 | at 56s | | 49 8 9 |
| | 82 | Ex. 75 | 45 | 3 | 11 | at 55s | | 126 1 8 |
| | 167 | | 93 | 2 | 19 | | | 253 3 2 |
| | *Charges.* | | | | | | | |
| | 2 months' discount | | | | | | 2 2 3 | |
| | Commission, 3 p. c | | | | | | 7 11 10 | |
| | | | | | | | | 9 14 1 |
| | | | | | | | | 243 9 1 |

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## No. 5.—Cheese from Perth Dairy Station, Ont. (C. A. Matheson, Esq.)

**Account Sales of 526 Boxes Cheese ex ss. "Numidian," sold for account of Jas. W. Robertson, Ottawa, by Hodgson Bros., Liverpool.**

| 1893. | | | Cwt. | qr. | lbs. | | £ s. d. | £ s. d. |
|---|---|---|---|---|---|---|---|---|
| Jan. 31.. | Ex. 31 | 155 boxes | 94 | 3 | 14 | at 55s. | | 260 18 2 |
| | 32 | 170 do | 94 | 0 | 15 | at 50s. | | 235 6 8 |
| | 33 | 100 do | 68 | 2 | 18 | at 49s. | | 168 4 5 |
| | 33 | 100 do | 70 | 0 | 11 | at 50s. | | 175 4 11 |
| | | 525 | 328 | 1 | 16 | | | 839 14 2 |
| | | 1 box given away. | | | | | | |
| | | 526 | | | | | | |
| | | Discount | | | | | | 9 17 6 |
| | | | | | | | | 831 16 8 |
| | | *Charges.* | | | | | | |
| | Freight, primage, £36 9s. 1d.; dues, &c., £1 7s. 3d. | | | | | | 47 12 8 | |
| | Advance in Canada | | | | | | 500 0 0 | |
| | Commission and guarantee at 4 p. c. | | | | | | 33 11 9 | |
| | Brokerage | | | | | | 2 17 10 | |
| | | | | | | | | 584 2 3 |
| | Net proceeds | | | | | | | 247 14 5 |

## No. 6.—Cheese from Perth Dairy Station, Ont. (C. A. Matheson, Esq.)

**Account Sales 30 Boxes Cheese sold by A. Clement & Son.**

| 1893. | | | Cwt. | qr. | lbs. | | £ s. d. | £ s. d. |
|---|---|---|---|---|---|---|---|---|
| Jan. 9.... | Ex. 34 | 10 boxes | 6 | 2 | 21 | at 52s. 9d | 17 12 10 | |
| | 35 | 10 do | 6 | 3 | 23 | at 53s. | 18 8 8 | |
| | 36 | 10 do | 6 | 1 | 22 | at 53s. | 17 1 8 | |
| | | | | | | | 53 3 2 | |
| | | *Charges.* | | | | | | |
| | | | | | | £ s. d. | | |
| | 2 months' discount | | | | | 0 8 11 | | |
| | Commission, 3 p. c. | | | | | 1 11 10 | | |
| | Freight | | | | | 0 15 3 | | |
| | | | | | | | 2 16 0 | |
| | Net proceeds | | | | | | | 50 7 2 |

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## DAIRYING, STOCK ACCOUNT.

| — | No. of Tubs. | No. of Pounds. | Price. |
|---|---|---|---|
| | | | $ cts. |
| Butter made in 1891-92— | | | |
| Mount Elgin Dairy Station | | 11,062 | |
| Woodstock Dairy Station | | 11,635 | |
| | | 22,697 | |
| Butter sold in 1891 92— | | | |
| J. L. Grant & Co., Ingersoll | | 8,920 | 1,559 66 |
| Jas. Park & Son, Toronto | | 1,176 | 258 98 |
| A. Clement & Son, Glasgow | | 9,619 | 1,953 75 |
| Thos. Shaw, Montreal | | 805 | 155 28 |
| D. Derbyshire, Brockville | | 99 | 19 18 |
| | | 20,619 | 3,946 85 |
| Sold to patrons, Mount Elgin | | 835 | |
| do Woodstock | | 610 1/10 | |
| Sold to sundry persons, Mount Elgin | | 344 | 79 29 |
| Given away at Mount Elgin | | 56 1/2 | |
| do Woodstock | | 30 3/10 | |
| Accounted for by shrinkage | | 202 1/4 | |
| | | 22,697 | 4,026 14 |
| Butter made and purchased in 1892-93— | | | |
| Kingslear Dairy Station, N.B | | 23,691·7 | |
| London do Ont | | 5,563 | |
| Mount Elgin do Ont | | 23,798 | |
| Sussex do N.B | | 6,496·7 | |
| Wellman's Corners do Ont | | 14,037 | |
| Woodstock do Ont | | 15,120 | |
| S. M. Barre for Liverpool Exhibition | 1 | 50 | 12 50 |
| C. C. Brown do | 1 | 46 | 9 20 |
| Isaac Wenger do | 1 | 50 | 10 00 |
| | | 88,852·4 | 31 70 |
| Butter sold in 1892-93— | | | |
| Fitzgerald, Scandrett & Co., London, Ont | 368 | 18,720 | 4,439 48 |
| Hodgson Bros., Liverpool, Eng | 84 | 4,144 | 900 36 |
| A. J. Rowson, London, Eng | 185 | 9,095 | 1,706 21 |
| J. T. Warrington | 108 | 5,519 | 911 90 |
| A. Clement & Son, Glasgow | 184 | 9,167 | 1,527 76 |
| A. Callender & Co., Liverpool | 4 | 194 | 37 48 |
| Thos. Shaw, Montreal | 142 | 7,131 | 1,597 85 |
| Sold locally at the dairy stations | | 24,867·7 | 5,897 96 |
| | 1,075 | 78,837·7 | 17,019 00 |
| Sold to patrons at the dairy stations and deducted from the balances due them in making the final settlement | | 9,368 | |
| Accounted for by shrinkage | | 646·7 | |
| Fitzgerald, Scandrett & Co., due on account | | | 52 32 |
| | 1,075 | 88,852·4 | |

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## PART X.—CANADIAN DAIRY PRODUCTS AT THE WORLD'S COLUMBIAN EXPOSITION.

In the summer of 1892, I was invited by Prof. Wm. Saunders, Executive Commissioner for Canada at the World's Columbian Exposition, to make such arrangements as might be necessary and advantageous to the dairymen of Canada in making a representative and creditable display of butter and cheese at Chicago in 1893.

During the winter of 1891–92 some 75 boxes of cheese of the make of 1891 were selected and purchased from Messrs. J. L. Grant & Co., of Ingersoll, Ont. At that time no announcement had been received from the chief of the Department of Agriculture of the World's Fair, showing the classification, plan for exhibiting, or method of judging which would be adopted. It was thought prudent to have those cheese of 1891 on hand, in case an opportunity should be presented through which they might be used to illustrate the keeping qualities of Canadian cheese. They were exhibited on the Dairy Pyramid in the Agricultural Building from the opening of the exhibition, and were examined there by the judges of cheese in the June competition. The following is the verdict given on them :—

"We consider the two-year-old cheese on exhibition there to be excellent in flavour, in body and texture, and have never seen cheese which tried better at the same age.

"(Sgd.) JOHN H. HODGSON,
A. F. MACLAREN."

Some of them were also put on exhibition in October, 1893. They were examined by the judges and by the leading experts in cheese-making who visited the Word's Fair. They were rated as "almost faultlessly fine." These cheese of 1891 were ultimately sold at 10 cents per pound; and thus very little loss was entailed by the purchase of them.

On August 18th, 1892, I issued a bulletin giving information of the plan which it was proposed to follow in securing exhibits of cheese and butter. 4,500 copies of this bulletin were distributed (in English and French), and a summary of its contents was published in many of the newspapers. It appeared to meet with the approval of the dairymen of Canada—with one or two unimportant exceptions. I attended the meetings of the Dairymen's Boards of Trade at several places and urged upon the dairymen the desirability of preparing to make exhibits. I also met the Cheese and Butter Association of Montreal, to take counsel with its members in regard to the plan to be followed.

Several gentlemen, whose official positions, personal ability and interest in the success of Canadian dairy products commended them, were invited to assist in making final selections of exhibits. D. M. Macpherson, Esq., Lancaster, Ont., President of the Dominion Dairymen's Association, gave a ready assent and rendered excellent service. The following is a copy of a letter which was sent to Wm. Eager, Esq., President of the Dairymen's Association of Eastern Ontario :—

OTTAWA, October 8, 1892.

WM. EAGER, Esq.,
President Dairymen's Association of Eastern Ontario,
Morrisburg, Ont.

DEAR SIR,—I am writing the Presidents of the other two Dairy Associations of Ontario, to associate with themselves some one who is active in promoting the work of the Associations and who is in cordial sympathy with the effort which I am making to secure a most creditable display of Canadian cheese and butter at the World's Columbian Exposition. If you desire to seek the advice of the Board of Directors in this matter, please do so; or you may nominate some competent expert, whom with yourself, I may consult in reference to matters that may arise from time to

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time in the selection of cheese from Eastern Ontario. Since the Dairy Associations at their last conventions recommended this work to the charge ofmy department, I am anxious to avail myself of their further helpful advice.

The enclosed sheet contains a copy of the resolutions which have been cut from the official reports (of the Dairy Associations of the province of Ontario.)

I am, yours very truly,

JAS. W. ROBERTSON,
*Dairy Commissioner.*

---

Similar letters were sent to John Geary, Esq., London, Ont., President of the Dairymen's Association of Western Ontario, and D. Derbyshire, Esq., Brockville, Ont., President of the Ontario Creameries Association. Mr. Eager nominated John T. Warrington, Jun., Esq., Belleville, Ont.; Mr. Geary nominated A. F. MacLaren, Esq., Stratford, Ont., (now of Windsor, Ont.); and Mr. Derbyshire nominated J. S. Pearce, Esq., London, Ont. Mr. H. S. Foster, Knowlton, Que., President of the District of Bedford Dairymen's Association, had been appointed by the Executive Commissioner for the province of Quebec, to assist in preparing exhibits. He and Mr. J. de L. Taché, Ex-Secretary of the Dairymen's Association of Quebec, were invited to co-operate. Subsequently all these gentlemen were also requested to give personal attendance at Chicago in October, 1893, to assist in looking after the interests of Canadian cheese and butter.

### THE MAMMOTH CHEESE.

As a unique feature of the Canadian exhibits, I was authorized to manufacture a Mammoth Cheese, which was intended as an advertising vehicle which would carry news-paragraphs, about the Canadian dairy industry and the opportunities which this country enjoys and affords for successful dairy farming, into all lands whence we might hope to attract desirable settlers. Particulars are mentioned in the fly-leaf in a following page. Through the courtesy of Mr. Van-Horne, President of the Canadian Pacific Railway Company, a special World's Fair cheese train was arranged for, to leave Perth on Monday, 17th April. A time-table was published, showing when the train would stop at the various railway stations between Perth, Ont., and Windsor, Ont. Throngs of people crowded the stations. The surface of the steel case of the cheese had been nicely painted before it left Perth; that was almost entirely covered by the autographs of persons of all ages, who scrambled on the car to inscribe their names. By this same Word's Fair cheese train, were sent 6 large cheese of 1,000 pounds each, which had been obtained from Mr. D. M. Macpherson of the Allan Grove Combination. There were also sent 176 boxes of cheese similar to those which were to be entered in the different classes for competition, together with 10 cases of cheese of Stilton shape, to be used in decorating the Dairy Pyramid. These cheese of Stilton shapes were obtained from Mr. C. W. Riley, Ingersoll, Ont., Mr. Geo. Hately, Brantford, Ont., and Mr. H. S. Foster, Knowlton, Que.

Permission was obtained from the Chief of the Department of Agriculture to place the Mammoth Cheese in the Agricultural Building, instead of in the Dairy Building, which was in a rather out-of-the-way part of the grounds. The Mammoth Cheese was made the centre of a Dairy Pyramid on the space allotted to Canada.

It was duly installed within a few days after the opening the Exhibition on May 1st. A short delay was caused by the ponderous exhibit breaking some of the joists supporting the floor.

The official judges were invited to examine the Mammoth Cheese and those on the Dairy Pyramid, which had, already on the 14th of June, been exposed to extreme heat under the glass-roofed building wherein they were placed. The following is a copy of the testimonial which they gave :—

JACKSON PARK, CHICAGO, ILL., 14th June, 1893.

We have examined the Mammoth Canadian cheese on the Dairy Pyramid in the Agricultural Building at the World's Columbian Exposition. For a cheese of such

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huge size, we pronounce the flavour "remarkably good," and the body "extraordinarily fine." We found the 1,000 pound cheese to be of fancy quality and in first rate condition.

We consider the 2-year-old cheese on exhibition there to be excellent in flavour, in body and texture, and have never seen cheese which tried better at the same age.

After examining the cheese on the dairy pyramid from the provinces of Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island, it is our judgment that they are a lot of superior quality, and form a display which is most creditable.

(Signed), JNO. H. HODGSON,
A. F. MACLAREN."

The judges bored into the Mammoth Cheese to a depth of 2 feet and found it uniformly solid. As it had become a centre of attraction, a display card from the Immigration Department was attached to it. Fly-leaves to the number of some 70,000 were given away to those who stopped to make inquiries. These cards contained a cut of the Canadian dairy pyramid, and gave the following facts concerning the Mammoth Cheese and the dairy interests of Canada :—

The "Canadian Mite," was manufactured at the Dominion Experimental Dairy Station, at Perth, Lanark County, Ontario, under the supervision of Prof. James W. Robertson, Dominion Dairy Commissioner. It forms part of the pyramid of Canadian Dairy Products at the World's Columbian Exposition, at Chicago.

207,200 pounds of milk were used in making it; that quantity is equal to the milk for one day in September of ten thousand cows. Mr. J. A. Ruddick, of the Dairy Commissioner's Staff, was the cheesemaker, and he was assisted by cheesemakers from twelve adjacent factories. Their names are:

Messrs. James McCann, Riverside Factory,
James Clark, Mississippi Factory,
Richard Halpenny, Drummond Centre Factory,
Wallace Symes, Balderson's Corners Factory,
David Ennis, Falbrook Factory,
W. Wrathall, Harper's Corners Factory,
Max. Gibson, Bathurst Mutual Factory,
John McMunn, Tay Banks Factory,
John Wiltsie, S. L. U. Factory,
James Kirkland, Lone Star Factory,
Thomas Wright, Stanleyville Factory,
Elijah Hughes, Clear View Factory.

The cheese weighs 22,000 lbs. net. It is incased in the mould or hoop of steel in which it was pressed, and a pressure of more than two hundred tons was applied to make it perfectly solid. It measures twenty-eight feet in circumference by six feet in height.

* * * * * * * *

The exports of cheese from Canada exceed in value the total exports of cheese from the United States. The soil, climate, cattle and transportation facilities in Canada are admirably adapted for the prosecution of successful dairy farming.

The Dominion Government has established experimental dairy stations in different parts of Canada, and the Provincial Governments manage travelling dairies and dairy schools for the education of those interested in that branch of farming.

There are over 1,500 co-operative cheese factories and creameries in Canada. In most of the provinces there are excellent opportunities for intelligent farmers with some means, to make dairy farming pay well.

There are great areas of unoccupied fertile land in the Canadian North-west; and in the older provinces of Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Manitoba and British Columbia, improved farms can be purchased in neighbourhoods where all the snug conveniences of life may be enjoyed.

Free farms of 160 acres can be obtained in the Canadian North-west. For information apply to the Department of the Interior, Ottawa, Canada; or to James Anderson, Suite 509, Stock Exchange Building, Chicago, Ill.

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A stair-case was built at one side of the Mammoth Cheese, to permit visitors to look at it, where a small portion of the cheese was uncovered. Some mischievous lads broke through the rind of the cheese and dug into it, for the purpose of getting a taste, and left it in a rather injured condition. In consequence of this, only a small portion was thereafter to be seen through glass.

The Mammoth Cheese was examined in June, again in July, again in September, and lastly in October, when the following recommendation was issued on its behalf by the official judges:—

"WORLD'S FAIR GROUNDS, JACKSON PARK,
"CHICAGO, 13th October, 1893.

"We, the undersigned, judges of cheese at the World's Columbian Exhibition in October, 1893, certify that we this day examined the Mammoth Cheese from Canada in the Agricultural Building by boring into it with a trier to a depth of 33 inches.

"We report that the cheese is sound from the rind to the centre, that it draws perfectly solid, and cuts close in the texture; it has a good, clean flavour, which is quite tasty. In our opinion, it has kept its flavour remarkably well. We found the colour uniform and true; the workmanship of the making is most creditable. We attach a score card, which shows 95 points out of a possible score of 100 points, and recommend that a medal and diploma be awarded to the Dairy Commissioner for Canada.

"Being informed of the conditions under which the Mammoth Cheese, now thirteen months old, was exhibited during the summer in a building with a glass roof, where the temperature often stood over 95 degrees, the excellence of its quality was a source of surprise and wonder to us all.

(Signed) "GEO. E. PERLEE,
"A. H. BARBER,
"A. F. MACLAREN."

The cheese has been shipped to Great Britain; but it had already served its end in having directed the attention of food consumers and farmers throughout most of Europe, to the possibilities which Canada enjoys and offers for the production of fine dairy products and the following of dairy-farming with success.

### SELECTION OF EXHIBITS.

A second edition of the bulletin "Canadian Dairy Products for the World's Columbian Exposition," was issued on the 28th April, 1893. It was similar to the bulletin issued in August, 1892, with the addition of particulars of the rules of the Exposition relating to butter.

From the cheese at Montreal and Ingersoll, 162 exhibits were selected to be forwarded to Chicago for the Exhibition in June. Of these, 135 were of the make of 1892, and 27 lots were of the make of 1893. Forty-three exhibits of butter were sent.

### CHEESE.

Each exhibit of cheese and butter was judged according to a score of points. The score cards set forth an analysis of the excellencies of the different exhibits under the proper headings. Those used for cheese were:—

| | |
|---|---|
| Flavour | 45 |
| Texture and body | 30 |
| Colour | 15 |
| Finish | 10 |

It was possible for a perfect exhibit to receive 100 points.

The judges appointed by the Exposition Committee on awards, were Messrs. John H. Hodgson, of New York, and A. F. MacLaren, of Windsor, Ont. Both are

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EXHIBITION OF CANADIAN DAIRY PRODUCTS—AGRICULTURAL BUILDING, WORLD'S FAIR, CHICAGO.

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judges of the highest reputation on the continent. They agreed to recommend that all exhibits of cheese, which received a score of 90 points and over, should be awarded a medal and diploma.

One hundred and twenty-nine exhibits from Canada were found to be scored high enough to entitle them to awards; and 31 exhibits of Canadian cheese were scored at a higher number of points severally, than the highest award given to any exhibit from any other country in the same classes. The following are the names of the successful exhibitors, together with the points scored by each successful exhibit:

*Ontario.*

| | Points. |
|---|---|
| J. W. Blyth, West Flamboro, Ont | 98 |
| W. F. Gerow, Napanee, Ont | 97 |
| John Lain, Big Springs, Ont | 97 |
| J. A. Ruddick, Perth, Ont | 97 |
| James A. Gray, Atwood, Ont | 96 |
| John Dempsey, Fairview, Ont | 96 |
| Gideon Moore, Kenilworth, Ont | 96 |
| T. J. Ballantyne, Listowel, Ont | 96 |
| J. T. Warrington (Allan's Settlement) Belleville, Ont | 96 |
| McAuley & Keeley, Railton, Ont | 96 |
| John Morrison, Newry, Ont | 96 |
| J. A. James, Nilestown, Ont | 96 |
| Amos Pickard, Wellburn, Ont | 95 |
| W. S. Stocks, Markdale, Ont | 95 |
| Jas. E. Young, Strathroy, Ont | 95 |
| James A. Gray, Atwood, Ont | 95 |
| F. E. Kline, Lakefield, Ont | 95 |
| W. F. Gerow, (No. 2) Napanee, Ont | 95 |
| Everetts & Strong (Lone Star) Easton's Corners, Ont | 95 |
| Geo. McDonald, Bluevale, Ont | 95 |
| B. J. Connolly, Kintore, Ont | 94 |
| Frank Meech, North Augusta, Ont | 94 |
| D. M. Macpherson (Fraserfield), Lancaster, Ont | 94 |
| D. M. Macpherson (Apple Hill) Lancaster, Ont | 94 |
| E. J. Madden, Newburgh, Ont | 94 |
| Sarah Baskett, London, Ont | 94 |
| M. K. Everetts & Son (Rideau Valley) Easton's Corners, O. | 94 |
| W. F. Gerow, Napanee, Ont | 94 |
| B. J. Connolly, Kintore, Ont | 94 |
| W. Whelan, Centreville, Ont | 94 |
| W. F. Gerow, Napanee, Ont | 94 |
| J. T. Warrington, (Alexander) Belleville, Ont | 94 |
| W. Woods, Molesworth, Ont | 93 |
| J. T. Warrington, (Prince of Wales) Belleville, Ont | 93 |
| F. E. Kline, Lakefield, Ont | 93 |
| B. J. Connolly Kintore, Ont | 93 |
| B. J. Connolly, Kintore, Ont | 93 |
| D. A. Dempsey, Stratford, Ont | 93 |
| Everetts & Strong, Easton's Corners, Ont | 93 |
| D. M. Macpherson, (Bainsville) Lancaster, Ont | 93 |
| John Brayley, Marston, Ont | 93 |
| J. S. Clarke, Warwick West, Ont | 92 |
| John Connolly, Malcolm, Ont | 92 |
| Frank Millson, Pinkerton, Ont | 92 |
| George Cleall, Selby, Ont | 92 |
| R. Cornett, Dundalk, Ont | 92 |
| J. J. Porritt, Tweed, Ont | 92 |



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| | Points |
|---|---|
| S. R. Payne, Warsaw, Ont | 92 |
| J. A. James, Nileston, Ont | 92 |
| R. Cuddie, Woodstock, Ont | 92 |
| W. Whelan, Centreville, Ont | 92 |
| J. T. Warrington, (Union) Belleville, Ont | 92 |
| W. H. Effingham, Crumlin, Ont | 91 |
| Sarah Baskett, London, Ont | 91 |
| G. E. McTaggart, Rodgerville, Ont | 91 |
| James McKellar, Tiverton, Ont | 91 |
| James McCabe, Eastwood, Ont | 91 |
| William Eager, Morrisburg, Ont | 91 |
| L. P. Hubbs, Hillier, Ont | 91 |
| Charles Stewart, Flesherton, Ont | 91 |
| B. J. Connolly, Kintore, Ont | 91 |
| W. Whelan, Centreville, Ont | 91 |
| J. Wilford, Brownsville, Ont | 91 |
| M. K. Everetts & Son, (Rideau Valley) Easton's Corners, O. | 90 |
| J. A. Ruddick, Perth, Ont | 90 |
| G. B. Brodie, Pond Mills, Ont | 90 |
| J. T. Warrington, Belleville, Ont | 90 |
| Mrs. Eliza Parsons, Guelph, Ont | 90 |
| B. J. Connolly | 90 |
| E. J. Madden, Newburgh, Ont | 90 |
| Unknown, Ont | 95 |

*Quebec.*

| | |
|---|---|
| A. T. Newton, Abercorn, Que | 97 |
| Andrew Fossy, Granboro', Que | 96 |
| C. A. Beattie, (No. 2), Iron Hill, Que | 96 |
| Nap. Desfosses, (No. 1), Nicolet, Que | 96 |
| Nap. Desfosses, Nicolet, Que | 95 |
| C. A. Beattie, Iron Hill, Que | 95 |
| J. N. Duguay, La Baie du Febvre, Que | 95 |
| R. Wherry (Mountain Pass), Knowlton, Que | 95 |
| Mrs. A. Macfarlane, Sutton Junction, Que | 95 |
| S. Duhamel, Pigeon Hill, Que | 95 |
| C. D. Jewell, Sweetsburg, Que | 95 |
| Mrs. Nazaire Vidal, Warwick, Que | 94 |
| Edmund Deauplaise, St. Pie de Guire, Que | 94 |
| D. F. Sweet, Sweetsburg, Que | 94 |
| W. A. Perkins, East Dunham, Que | 94 |
| Ger. St. Pierre, East Arthabaska, Que | 94 |
| R. Wherry, Knowlton, Que | 94 |
| R. J. Tilson, Haseville, Que | 94 |
| W. A. Wells, Sutton, Que | 94 |
| W. Parent, St. Elphège, Que | 94 |
| H. O. Wales, Sutton Junction, Que | 94 |
| Mrs. A. Macfarlane, Sutton Junction, Que | 94 |
| Mrs. A. Newton, Abercorn, Que | 94 |
| R. Wherry (No. 2), Knowlton, Que | 94 |
| J. N. Duguay (No. 3), La Baie du Febvre, Que | 94 |
| Mrs. M. J. Tracy, Mansonville, Que | 93 |
| R. J. Tilson, Haseville, Que | 93 |
| Mrs. C. D. Jewell, Sweetsburg, Que | 93 |
| C. D. Jewell, Sweetsburg, Que | 93 |
| George Miller, West Brome, Que | 93 |

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| | Points. |
|---|---|
| Arthur Macfarlane, Cowansville, Que | 93 |
| R. Morrison, Knowlton, Que | 93 |
| C. A. Beattie, (No. 1), Iron Hill, Que | 93 |
| A. Macfarlane, Sutton Junction, Que | 93 |
| D. O. Bourbeau, Victoriaville, Que | 93 |
| Edmund Deauplaise, St. Pie de Guire, Que | 92 |
| W. S. Purdy, Savage's Mills, Que | 92 |
| D. O. Bourbeau, Victoriaville, Que | 92 |
| W. A. Perkins, East Dunham, Que | 92 |
| Mrs. C. D. Jewell, Sweetsburg, Que | 92 |
| A. Crittenden, West Brome, Que | 92 |
| Alfred Trudel, St. Prosper, Que | 92 |
| T. McKee, Sutton Junction, Que | 91 |
| George Miller, West Brome, Que | 91 |
| W. Parent, St. Elphège, Que | 91 |
| J. N. Duguay, (No. 1.) La Baie du Febvre, Que | 91 |
| R. Wherry, Knowlton, Que | 91 |
| J. W. Benjamin, West Brome, Que | 91 |
| Gabriel Hamel, Cap Santé, Que | 91 |
| C. A. Beattie, Abercorn, Que | 91 |
| J. A. Howie, (Vale Perkins), Millington, Que | 90 |
| J. L. & H. S. Gilbert, Dunham, Que | 90 |

*Maritime Provinces.*

| | |
|---|---|
| Angus Cameron, Antigonish, N.S | 96 |
| D. McPhie, River John, N.S | 92 |
| T. J. Dillon, New Perth, P.E.I | 91 |
| T. J. Dillon, New Perth, P.E.I | 90 |
| Allen Kennedy, Union Centre, N.S | 90 |
| C. L. Tilley & Son, Waterville, N.B | 90 |

BUTTER.

It was not expected that the main exhibit of butter from Canada would be made until October. The judges of butter in the June competitions were Messrs. Manfield of Wisconsin, and John S. Pearce of London, Ont. The scoring card used was:

| | |
|---|---|
| Flavour | 45 |
| Grain | 25 |
| Colour | 15 |
| Salting | 10 |
| Packing | 5 |
| | 100 |

The minimum standard of points, at and above which the judges decided to recommend exhibits for a medal, was fixed at 97. Notwithstanding the few lots which were sent from Canada, 13 were scored at above the minimum. Eleven of these went to the province of Quebec, mostly to the county of Brome, where they were collected by H. S. Foster, President of the District of Bedford Dairymen's Association.

The following is the record of points scored by exhibitors:

| | |
|---|---|
| J. D. Leclair, Ste. Thérèse de Blainville, Que | 99 |
| do do | 99 |
| L. R. Whitman, Knowlton, Que | 99 |
| H. Chamberlain, West Bolton, Que | 99 |
| J. D. Leclair, St. Hyacinthe, Que | 98 |



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| | Points. |
|---|---|
| N. P. Emerson, Sutton Junction, Que | 98 |
| T. L. Burnett, Farnham Centre, Que | 98 |
| S. R. Brill, Teeswater, Ont | 97 |
| J. D. Leclair, Ste. Thérèse de Blainville, Que | 97 |
| N. P. Emerson, Sutton Junction, Que | 97 |
| T. L. Burnett, Farnham Centre, Que | 97 |
| Croll & McCullogh, Glenroy, Ont | 97 |
| W. P. Hillhouse, Knowlton, Que | 97 |

After the June competition, some of the cheese, which had won awards, were displayed for a time in the dairy building. No provision was made for keeping the building cool, and nearly all the cheese which had been in competition, as well as those from the dairy pyramid in the agricultural building, were put temporarily into the cold storage building on the exhibition grounds. Unfortunately, that building was shortly afterwards destroyed by fire, with a lamentable loss of life. A few boxes of cheese were rescued from the debris, but most of those we had put in, were either wholly consumed or spoiled.

### Change of Plan.

In my opinion it was not desirable that another exhibit of cheese or butter should be sent from Canada before October. An intimation to that effect was made public through the newspapers and in other ways. The following letter which I sent to the president of the Dairymen's Association of Western Ontario, sets forth some of the reasons why it was decided not to send cheese or butter to Chicago a second time before the cool weather of autumn:—

"Ottawa, July 1st, 1893.

"John Geary, Esq.,
President Dairymen's Association of Western Ontario,
London, Ont.

"My Dear Sir,—This afternoon I telegraphed you as follows: 'I offer my congratulations upon success of Canadian cheese at Chicago; letter from Wheaton received; I will be glad to accept what assistance Association can offer in collecting exhibit for September or October.'

"Late to-night I received your telegram, which reads as follows: 'Exhibit at Chicago considered by executive to-day; think full information should be made public at once; are June cheese to be sent to Chicago, when will it be judged? What other months are to be shown, and when? How many lots from Western Ontario? Is number limited? Following resolution carried unanimously 'that selections of cheese for Chicago be made at factories, and it be left to the Executive of the Association to choose men in the trade to make such selection.' Answer at once."

Had Saturday not been a holiday and our office, to which messages are telephoned, not been closed, I might have been able to telegraph reply. Let me answer the points seriatim:—

1. *Full Information.*—If this refers to a publication of the results of the competition in June at Chicago, they cannot be published officially until I receive *official* intimation of them from the authorities of the World's Fair. I received the information informally, and it was given to the press in that way. The names of the successful exhibitors were given to the press of Toronto and Montreal yesterday, and should appear in Monday's paper.

If it refers to the next competition in which Canada will take part, information on that point was given to the public through the three morning newspapers of Toronto, and from them was copied into nearly all the papers of the Dominion. At least, I suppose so, as I have heard of it from the Maritime Provinces, Quebec and Ontario.

The reasons which caused me to advise that no Canadian cheese or butter be sent to Chicago for the July competition are briefly these:

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(*a*) No exhibitor who takes part in the competitions will receive more than one medal, no matter how many lots of his may score high enough;

(*b*) Canadian cheese took such an unprecedently high place in the June competition, that the good name of our industry and country was not likely to gain any additional prestige from any competition so close in point of time as the following month;

(*c*) The cost of making a creditable and representative exhibit is considerable, and should not be incurred unless an equivalent advantage can be gained;

(*d*) The time to get a satisfactory number of satisfactory exhibits together was short, as notwithstanding the fact that I had flooded the cheese-makers with bulletins on the subject, the interest had waned and almost died out, until the publication of the magnificent success in June revived it with additional intensity. I thought I foresaw that result.

(*e*) I think Canadian cheese and butter should be sent to Chicago for the competition for which exhibits are to be received during the first ten days of October. The competitions at our own exhibitions in Canada this year are likely to be unusually keen and general; these will be held mostly in September. I do not think that it would be to the advantage of Canada to take part in both the September and October competitions at Chicago; and I prefer the latter for the reason stated, and also because of the colder weather of October for our butter and cheese.

2. *Re June Cheese.*—I recommended to the authorities in Chicago last autumn the desirability of having sub-classes or sections for Junes, Julys, Augusts, &c., in which they would be judged separately as Junes, Julys, &c. They kept to the original announcement that "all cheese will be divided into two classes, that made previous to the year 1893, and that made during the year 1893." What is wanted is the *best* cheese in 1893,—no matter in what month made. As a rule Junes are not quite so fine, and would not score as high in September or October, as Augusts or Septembers would.

3. *Number of Lots.*—The number of lots which may be sent from Western Ontario is limited only (1) to 1 *cheese* for each class in which entry is made, (2) to the number of lots which are fine enough to pass inspection as per clause 6, page 8 of the Bulletin "Canadian Dairy Products for the World's Columbian Exposition." (Copy enclosed.)

4. *Resolution Adopted.*—I will be very glad if the association will designate men in the trade to make selections at the factories and to render such other assistance as they can give. The resolution reads, "That selections of cheese for Chicago be made at the factories, and it be left to the Executive of the Association to choose men in the trade to make such selections." I welcome this offer of assistance on the part of the executive. I do not suppose that the executive intend to intimate by the words that "it be left to the executive," that they are unwilling that other cheese which may be offered for exhibition (besides those which their appointed men in the trade may select) should also be sent forward to Chicago, if counted worthy. The executive of the association has always had the right and privilege which it has now expressed a willingness to exercise, but if the resolution intimates in even the slightest degree, that the executive of the association desires to exercise exclusive control to the extent of excluding from the World's Fair any cheese from Western Ontario which may not be selected under their supervision, then to that extent it does not meet my approval.

5. The facts contained in this letter may be found in more extended form in the bulletin issued from my office 28th April last, and mailed to all the cheese-makers, whose addresses I have—about 1,300 in all."

* * * * * * * * * * * * *

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On the 24th July, 1893, a third edition of the bulletin "Canadian Dairy Products for the World's Columbian Exposition," was issued. It contained full particulars of the provisions which had been made, and a copy of it is submitted herewith :—

## DEPARTMENT OF AGRICULTURE.

## CANADIAN DAIRY PRODUCTS

FOR THE

## WORLD'S COLUMBIAN EXPOSITION.

DAIRY COMMISSIONER'S OFFICE,
Ottawa, 24th July, 1893.

I have been directed by the Honourable the Minister of Agriculture, to make such arrangements as may be necessary to assist the dairymen of the Dominion to make another truly representative and creditable display of Butter and Cheese at the World's Columbian Exposition. Dairy products will be received at Chicago for the next exhibition in which Canada will be represented between the first and tenth of October.

The following extracts from the rules of the Department of Agriculture of the World's Columbian Exposition, set forth the particulars in reference to the classes for Butter and Cheese.

Canadians may be Exhibitors in any or all of them.

### BUTTER.

EXTRACTS FROM THE RULES OF THE DEPARTMENT OF AGRICULTURE OF THE WORLD'S COLUMBIAN EXPOSITION.

"12. The arrangement of all dairy exhibits will be under the control of this Department.

"13. Exhibits of butter will be classified and limited, as follows:—

Class 1. *Dairy*,—butter made by exhibitor on the farm from a mixed herd. Exhibit to consist of not more than one package, weight to be not less than 10 nor more than 20 pounds.

Class 2. *Dairy*,—butter made by exhibitor on the farm from a herd of *one breed*. Exhibit to consist of not more than one package, weight to be not less than 10 nor more than 20 pounds.

Class 3. *Prints and fancy packages*,—butter must be manufactured by exhibitor. Exhibit to occupy space not exceeding 18 inches square. Total weight of exhibit not to exceed 20 pounds.

Class 4. *Creamery*,—butter made by the exhibitor from the milk of *mixed herd* from cream separated from the milk in the creamery where the butter is made. Exhibit to consist of one commercial package, to weigh not less than 55 pounds.

Class 5. *Creamery*,—butter made by exhibitor from gathered cream. Exhibit to consist of one commercial package, to weigh not less than 55 pounds.

"19. Butter will be judged on the following points, the figures set opposite indicating the maximum per cent, the total of all such maximums being 100:

| | |
|---|---|
| Flavour | 45 |
| Grain | 25 |
| Colour | 15 |
| Salting | 10 |
| Packing | 5 |
| Total | 100 |

"The general standard of colour for butter will be "*June Grass Butter*."

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Canadians should make excellent exhibits in all classes, except in class 3.

In that class, *Prints and fancy packages*, we want only a few choice lots.

In order to afford intending exhibitors every reasonable facility, I am permitted to make the following announcements and to invite the hearty co-operation of butter-makers, creamery-managers, patrons and dairymen, in an effort to make such a display of CANADIAN BUTTER as will direct the attention of the world, in a favourable manner, to the admirable opportunities which Canada offers for profitable dairy farming.

(1.) Those who intend to exhibit may write to the Dairy Commissioner, Ottawa (postage free), asking for butter tubs, address labels, and entry forms.

(2.) Any butter-maker, dairyman or representative of any dairy or creamery, may send butter for exhibition, addressed to the Dairy Commissioner at Montreal or Ingersoll, Ont., to reach either place not later than 26th September.

(3.) For the *Dairy* and *Creamery* classes, tubs of a uniform size and style will be furnished at cost price to intending exhibitors.

(4.) The butter should be packed securely so as to avoid injury from heat during transit from the place of manufacture to Montreal or Ingersoll, Ont. Refrigerator cars will be used between these places and Chicago; and refrigerator space under glass has been provided at the Dairy Building on the Exhibition Grounds.

(5.) The Dominion Government will pay all freight charges, as well as the cost of caring for the butter during the exhibition and until it is disposed of afterwards.

(6.) By the authority of the Honourable the Minister of Agriculture, I am permitted to state that the Government will advance such a price as may be fixed by the Dairy Commissioner, on all the butter which is received at Montreal and Ingersoll.

(7.) Several expert judges of acknowledged reputation in Ontario and Quebec have been invited to assist the Dairy Commissioner in selecting from the lots which are received at Montreal and Ingersoll, such butter as may be counted worthy of being sent to Chicago.

(8.) After the awards have been made at Chicago, the butter which has won medals, or honourable mention, will be arranged in Provincial groups, where it will be used as may best set forth facts pertaining to the dairy and general agricultural interests of the several Provinces of Canada.

## CHEESE.

### EXTRACT FROM THE RULES OF THE DEPARTMENT OF AGRICULTURE OF THE WORLD'S COLUMBIAN EXPOSITION.

"14. Exhibits of cheese from the United States and Canada will be classified and limited, as follows:—

Class 1. *Cheddars*—Exhibit to consist of one cheese, diameter not less than 14 nor more than 16 inches, height not less than 9 inches, weight to be not less than 50 pounds.

Class 2. *Cheddars*—Home trade—Exhibit to consist of one cheese not less than 6 inches in height and not less than 12 nor more than 15 inches in diameter.

Class 3. *Mediums*—Exhibit to consist of one cheese not less than 6 nor more than 7½ inches in height, diameter not less than 14 nor more than 15½ inches.

Class 4. *Flats*—Exhibit to consist of one cheese, diameter not less than 13 nor more than 16 inches, weight not less than 25 nor more than 40 pounds.

Class 5. *Young Americas*—Exhibit to consist of four cheese in one package, total weight to be not less than 30 nor more than 45 pounds.

Class 6. *Domestic Swiss*—Exhibit to consist of one cheese, weight to be not less than 30 pounds.

Class 7. *Brick Cheese*—Exhibit to consist of six bricks in one package, total weight to be not less than 20 nor more than 40 pounds.

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Class 8. *Dairy*—Cheese made by exhibitor on the farm from exhibitor's own herd. Exhibit to consist of one cheese, weight to be not less than 30 pounds.

Class 9. *Pineapple Cheese*—Exhibit to consist of four cheese in one package.

"15. Cheddars and flats will each be classified in two groups, viz., white and coloured, and will be separately judged. Cheese other than that mentioned above, offered for exhibition from the United States and Canada, and all cheese offered for exhibition from points outside of the United States and Canada will be subject to such limitations and restrictions as to quality as may be decided upon by the Chief of the department at the time application for space is made.

"16. All cheese exhibited from the United States and Canada, known commercially as "*American*" and "*Canadian*" cheese, must be manufactured of full new milk.

"17. Cheese that has been cut, bored, or tried in any way, will not be admitted for exhibition.

"18. All cheese will be divided into two classes, that made previous to the year 1893, and that made during the year 1893, and will be judged on the following points, the figures set opposite each indicating the maximum per cent, the total of all such maximums being 100 :—

| | |
|---|---|
| Flavour | 45 |
| Texture and body | 30 |
| Colour | 15 |
| Make up | 10 |
| | 100 |

Canadian manufacturers of cheese should make numerous and excellent exhibits in Classes 1, 5 and 8. Class 5 will admit cheese which are commonly known as "Canadian Loaf" or "Truckle" cheese.

Since all cheese will be divided into two main classes, "that made previous to the year 1893, and that made during the year 1893," the cheese of the make of 1892 which were reserved at Montreal and Ingersoll will be entered in the exhibition to be held in October.

In order to give every cheese-maker, who has cheese of excellent quality, an opportunity of taking part in the exhibition, I am permitted to make the following announcements, and to invite the hearty co-operation of all cheese-makers, salesmen, factory managers and patrons, towards making such a display of Canadian cheese as will call the favourable attention of the world to the admirable facilities which the Dominion offers for profitable dairy farming.

(1.) Intending exhibitors may write to the Dairy Commissioner, Central Experimental Farm, Ottawa, (postage free) asking for address labels for cheese, and entry forms.

(2.) Any cheese-maker or other representative of any factory or dairy, may send by freight cheeses for any or all of the classes, addressed to the Dairy Commissioner, at Montreal, or Ingersoll, Ont., to reach either place not later than 26th September.

(3.) Two cheeses or packages for every entry should be sent; one cheese can be bored for testing at Montreal or Ingersoll, while the other may be forwarded intact to the World's Fair. The cheese from every factory, which will merit the highest number of points when judged in October—no matter in what month they were made —are wanted. Probably those selected from the last half of August or the first ten days of September will be best.

(4.) The Dominion Government will pay all freight charges, as well as the cost of caring for the cheese during the exhibition and until they are disposed of afterwards.

(5.) By the authority of the Honourable the Minister of Agriculture, I am permitted to state that the Government will advance such a price as may be fixed by the Dairy Commissioner, on all the cheeses which are received at Montreal and Ingersoll.

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(6.) Several expert judges of acknowledged reputation in Ontario and Quebec have been invited to assist the Dairy Commissioner in selecting from the lots which are received at Montreal and Ingersoll, such cheeses as may be counted worthy of being sent to Chicago.

(7.) After the awards have been made at Chicago, the cheeses which have won medals or have received honourable mention, will be arranged in provincial groups in the dairy building and on the dairy pyramid, where they will be used to advertise the dairy and general agricultural interests of the several Provinces of Canada.

### GENERAL.

The Dominion Government will bear all expenses of transporting, placing, caring for, and disposing of the butter and cheese.

The several exhibitors will be afforded every opportunity which may exist, or which may be provided, for winning medals and prestige for themselves; and they will not be asked to incur any loss, as the Government will not claim any rebate on the price which is advanced on the butter and cheese. This provides for liberal treatment of those engaged in the great dairy industry of Canada, and I invite your cordial co-operation in the effort to make the Canadian exhibit of butter and cheese the best which has ever been made.

JAS. W. ROBERTSON,
*Dairy Commissioner.*

After conferences with the Executive Committees of the Dairymen's Associations of Western Ontario and of Eastern Ontario, these committees decided to invite expert judges, mainly from among the cheese buyers, to assist the cheese-makers to make selections at the factories, of exhibits to be sent to Ingersoll and Montreal. It was agreed that the expenses incurred by these cheese buyers should be paid by the Dominion Government. Helpful assistance was rendered by these specially nominated experts, as well as by others who had also assisted in selecting cheese at the factories in the autumn of 1892.

### OCTOBER COMPETITION.

For the Exhibition in October, 539 exhibits of cheese and 167 exhibits of butter were sent to Chicago from Montreal and Ingersoll.

The judging was conducted in the fairest manner, as the following extracts from a report of a meeting of the official representatives of dairying at the World's Fair, will show :—

"A meeting of the official representatives of Dairying at the World's Columbian Exposition, from Iowa, Wisconsin, New York, Illinois, New Hampshire, Vermont, Nebraska, Connecticut, Minnesota and Canada was held on the Exhibition Grounds on Saturday, October 7th, 1893.

"A deputation (consisting of Messrs. Robertson, McKinstry, Ashburn, Gabrielson, Smith, Loomis and Arms), was appointed to lay the following recommendations before the proper authorities :—

1. "It is recommended in the judging of butter, that one person bore samples from the exhibits of butter and that a sample be given directly on a separate trier to every judge.

2. "It is recommended that every judge record his own judgment on a separate score card without consultation, and that the final score of points on every exhibit be the average of the score of points given by the three judges; but, in case there should be a difference of five points or more between the scoring of two of the judges in any one division of the score card, there shall be another examination made on lines similar to those of the first examination.

3. "It is recommended that the exhibitors be allowed a clerk to keep a record of the scores for the use of the representatives of dairying from the different States, and that the same clerk be named and paid by those representatives.

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4. "It is recommended that the same rules that govern the judging of butter shall govern the judging of cheese; and further, that the several exhibits of cheese be presented to the judges in a room, or in such a way that the source (as to locality and the individual exhibitor, cannot be known to the judges.

5. "It is recommended that three judges be appointed on cheese, viz.: one judge from Canada, one judge from the district of the Eastern States, and one judge from the district of the Western States.

"These recommendations, in the form of propositions, were adopted one by one, and unanimously, by the representatives of dairying at the World's Columbian Exposition from Iowa, Wisconsin, New York, Illinois, New Hampshire, Vermont, Nebraska, Connecticut, Minnesota, Indiana, and Canada.

(Signed) JAS. W. ROBERTSON,
*Chairman.*
A. P. McKINSTRY,
*Secretary.*"

"Confirmed:

For Iowa, C. I. Gabrielson; for Wisconsin, D. W. Curtiss; for New York, G. L. Smith; for Illinois, Lovejoy Johnson; for New Hampshire, W. D. Baker; for Vermont, H. M. Arms; for Nebraska, D. P. Ashburn; for Minnesota, A. P. McKinstry; for Indiana, Laura D. Wooley; for Canada, Jas. W. Robertson.

These recommendations were, as far as practicable, carried out, and the judging was done in such a way as to prevent any conscious or unconscious bias on the part of those who acted.

### CHEESE.

Messrs. Geo. E. Perlee, of New York, A. H. Barber, of Chicago, and A. F. MacLaren, of Windsor, Ont., were the judges appointed. It was decided by the judges to recommend (1), that cheese of the make of 1892, which were scored at 90 points or over, should be entitled to an award of a medal and diploma, and (2) that cheese of the make of 1893, which scored 95 points or over, should be entitled to an award of a medal and diploma.

The following is a list of the successful exhibitors, together with the number of points scored by each :—

## CHEESE OF 1892.

### ONTARIO.

| | POINTS. | | POINTS. |
|---|---|---|---|
| G. B. Brodie, Pond Mills | 97½ | D. M. Macpherson, Fraserfield | 96 |
| J. E. Young, Strathroy | 97½ | J. S. Clarke, Warwick West | 96 |
| J. W. Blyth, Lynden | 97 | J. Morrison, Newry | 96 |
| W. F. Gerow, Napanee | 97 | Sarah Baskett, London | 96 |
| G. Cleall, Selby | 97 | J. A. James, Nilestown | 95½ |
| G. Macdonald, Bluevale | 97 | Everetts & Strong, Easton's Corners | 95½ |
| R. Cornett, Dundalk | 97 | M. K. Everetts & Son, Rideau Valley | 95½ |
| A. Pickard, Wellburn | 97 | W. Whalen, Centreville | 95½ |
| W. S. Stocks, Markdale | 97 | J. J. Porritt, Tweed | 95½ |
| D. A. Dempsey, Stratford | 96½ | J. Beaton, Brantford | 95½ |
| M. K. Everetts & Son, Rideau Valley | 96½ | J. A. Ruddick, Ottawa | 95½ |
| J. Connolly, Malcolm | 96½ | L. P. Hubbs, Hillier | 95½ |
| J. A. Ruddick, Ottawa | 96½ | McAuley & Keeley, Railton | 95½ |
| Jas. McKellar, Wiarton | 96½ | W. H. Effingham, Crumlin | 95 |
| S. Howard, Gorrie | 96½ | G. E. McTaggart, Rodgerville | 95 |
| F. E. Kline, Lakefield | 96½ | D. M. Macpherson, Apple Hill | 95 |
| T. J. Ballantyne, Listowel | 96½ | J. McCabe, Eastwood | 95 |
| J. A. Gray, Atwood | 96 | D. M. Macpherson, Bainsville Factory | 94 |
| E. J. Madden, Newburgh | 96 | J. A. James, Nilestown | 94 |
| J. T. Warrington, Union | 96 | T. Meech, North Augusta | 94 |
| W. F. Gerow, Napanee | 96 | S. R. Payne, Warsaw | 94 |
| G. Eager, Chesterville | 96 | J. Raphael, Mallorytown | 94 |
| B. J. Connolly, Kintore | 96 | J. Wilford, Brownsville | 94 |

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| | Points. | | Points. |
|---|---|---|---|
| J. T. Warrington, Allan's Settlement | 94 | F. Wilson, Pinkerton | 92½ |
| J. Dempsey, Fairview | 93½ | C. Stewart, Flesherton | 92 |
| W. Embury, Tweed | 93½ | J. T. Warrington, Plum Grove | 91½ |
| J. T. Warrington, Prince of Wales | 93½ | do Alexander | 91 |
| do Allan's Settlement | 93½ | M. K. Everetts & Son, Old Fairfield | 90 |
| do Harold Factory | 93 | J. Lain, Big Spring | 90 |

### Quebec.

| | | | |
|---|---|---|---|
| J. Lemire, La Baie | 97 | Miller & Crittenden, West Brome | 95 |
| A. McFarlane, Sutton Junction | 96½ | D. F. Sweet, Sweetsburg | 95 |
| C. A. Beattie, Sutton Mountain | 96½ | J. W. Cummings, Ansen | 95 |
| Mrs. M. J. Tracey, Millington | 96½ | Mrs. A. MacFarlane, Sutton Junction | 95 |
| J. N. Duguay, Blue Star, No. 3 | 96 | Wm. McFarlane, West Brome | 94½ |
| A. Fossy, Grandboro | 96 | M. Fleurant, St. Patrick's Hill | 94½ |
| J. Morneau, St. Patrick's Hill | 96 | H. O. Wales, East Dunham | 94½ |
| T. W. McKee, Sutton Junction | 96 | J. N. Duguay, Blue Star, No. 3 | 94 |
| N. Desfosses, Blue Star, No. 25 | 96 | J. J. Ingalls, Dunboro | 94 |
| L. Genest, St. Patrick's Hill | 96 | A. T. Newton, Sutton | 94 |
| S. Duhamel, Pigeon Hill | 96 | Wm. Parent, Blue Star, No. 20 | 94 |
| R. Wherry, Knowlton | 96 | G. Boland, Ste. Ursule | 94 |
| C. A. Beattie, Iron Hill | 96 | C. D. Jewell, Sweetsburg | 93½ |
| Wm. Parent, Blue Star, No. 20 | 95½ | W. A. Wells, Sutton | 93½ |
| R. Wherry, Mountain Pass | 95½ | N. Desfosses, Nicolet | 93 |
| Ed. Beauplaise, Blue Star, No. 21 | 95½ | D. O. Bourbeau, Victoriaville | 93 |
| C. A. Beattie, Sutton | 95½ | G. St. Pierre, East Arthabaska | 93 |
| M. Robert, Milton East | 95½ | L. Genest, St. Patrick's Hill | 92 |
| Mrs. A. Newton, Sutton | 95 | J. N. Duguay, Blue Star, No. 1 | 92 |
| R. J. Tilson, Haseville | 95 | Mrs. N. Vidal, Warwick | 90 |
| G. St. Pierre, Arthabaska | 95 | W. Perkins, East Dunham | 90 |

### Maritime Provinces.

| | | | |
|---|---|---|---|
| T. J. Dillon, New Perth, P.E.I. | 97 | T. J. Dillon, New Perth, P.E.I | 93 |
| I. H. Hawkinsworth, Mabou, N.S. | 97 | J. A. Bartir, Avondale, N.B. | 92½ |
| J. N. Sloat, Tracey Mills, N.B. | 96 | Allan Kennedy, Union Centre, N.S. | 92 |
| L. C. Archibald, Antigonish, N.S. | 95 | C. L. Tilley & Son, Waterville, N.B. | 90 |
| A. Cameron, Dunmore, N.S. | 94½ | Sussex Dairy Co., Sussex, N.B. | 90 |

## CHEESE OF 1893; CHEDDAR.

### Ontario.

| | | | |
|---|---|---|---|
| A. W. Mallory, Mallorytown | 99½ | A. McGregor, Rankin | 99 |
| T. J. Ballantyne, Listowel | 99½ | J. R. Wiltse, Scotch Line | 99 |
| D. McKellar, Lakeside | 99½ | J. W. Mitchell, Lansdowne | 99 |
| L. A. Zufelt, Chesterville | 99½ | J. R. Dargavel, Elgin | 99 |
| C. H. Woods, South Finch | 99½ | J. H. Singleton, Newboro | 99 |
| A. F. Gardiner, Hawkesbury | 99½ | W. Campbell, Cannamore | 99 |
| J. Brayley, Marston | 99 | Dargavel & Murphy, Elgin | 99 |
| J. McDermott, Tiverton | 99 | P. W. Strong, Brockville | 99 |
| A. Pickard, Wellburn | 99 | R. R. Cranston, W. Magdala | 98½ |
| P. H. Green, Sheffield | 99 | G. H. Barr, Culloden | 98½ |
| B. L. King, Railton | 99 | W. W. Harris, Rothsay | 98½ |
| L. Stevens, Delta | 99 | R. Chown, Ingersoll | 98½ |
| H. Hockey, Dereham Centre | 99 | W. Murray, Underwood | 98½ |
| J. H. Singleton, Singleton | 99 | J. Marten, Wellman's Corners | 98½ |
| W. H. Sweet, Tilsonburg | 99 | J. L. Talbot, Lucan | 98½ |
| A. Chalmers, Moncton | 99 | W. B. Stevens, Lambeth | 98½ |
| J. Geary, London | 99 | W. Trousdale, Railton | 98½ |
| J. A. Gray, Atwood | 99 | T. Keenan, Kingston | 98½ |
| A. Spence, Belleville | 99 | Elgin Model Factory, Elgin | 98½ |
| J. B. Muir, Avonbank | 99 | J. Whitton, Wellman's Corners | 98½ |
| J. S. Isard, Williscroft | 99 | W. S. Sifton, Strathroy | 98½ |
| J. Morrison, Newry | 99 | G. Goodhand, Milverton | 98½ |
| Hodgson Bros., Roblin Factory | 99 | W. Eager, South Mountain | 98½ |
| H. E. Brintnell, Plainfield | 99 | A. Latta, Plainfield | 98½ |

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| | Points. | | Points. |
|---|---|---|---|
| W. Fitzgerald, Dufferin | 98½ | F. C. Taylor, Fairview | 97½ |
| H. P. Richardson, Kerwood | 98 | T. C. Mallory, Yarmouth Centre | 97½ |
| C. O. Luton, Lyons | 98 | J. C. Russell, Hollbrook | 97½ |
| R. White, Belleville | 98 | A. Millson, Gorrie | 97½ |
| R. Jardine, Camlachie | 98 | M. Chalcraft, Delaware | 97½ |
| E. Bates, Mount Elgin | 98 | E. Smith, Thorndale | 97½ |
| R. J. Hampton, Osman | 98 | J. Perkins, Leesboro | 97½ |
| J. D. Corliss, Vittoria | 98 | J. S. Grieve, Salford | 97½ |
| M. Morrison, Harriston | 98 | J. McComb, Belleville | 97½ |
| G. Beaton, Norwich | 98 | E. Cohoe, Humberstone | 97½ |
| W. J. Allan, Belleville | 98 | J. B. Gardiner, Mainsville | 97½ |
| T. D. Barry, Putnam | 98 | A. A. Parker, Rockford | 97 |
| M. R. Brown, Appin | 98 | L. D. Monk, Dorchester | 97 |
| G. Dickey, Lambeth | 98 | W. Hales, Belleville | 97 |
| J. F. Williams, Ingersoll | 98 | W. J. Atkinson, Granthurst | 97 |
| G. B. McLeod, Thamesford | 98 | J. M. Smith, Long Lake | 97 |
| J. McKellar, Tiverton | 98 | E. A. Hunter, Welland Station | 97 |
| R. Facey, Harrietsville | 98 | C. Stewart, Flesherton | 97 |
| T. Myers, Forfar | 98 | G. Moore, Kenilworth | 97 |
| J. A. Kinsella, Lancaster | 98 | M. J. Gray, Atwood | 97 |
| L. Patten, Oxford Mills | 98 | W. W. Brown, Attercliffe Station | 97 |
| R. T. Beckett, Malakoff | 98 | D. A. Dempsey, Stratford | 97 |
| C. J. Gilroy, Glen Buell | 98 | W. P. Dempsey, Belleville | 97 |
| F. Millson, Pinkerton | 98 | J. J. Miller, North Bruce | 97 |
| T. Grieve, Wyandotte | 98 | F. Boyes, Nileston | 97 |
| Miss E. A. Hannen, London | 98 | J. Herity, Warkworth | 97 |
| R. Lannigan, Belleville | 98 | D. W. Garvey, Talbotville | 97 |
| Murdoch & Morrison, Harriston | 98 | R. Cornett, Dundalk | 97 |
| P. Keeleher, Belleville | 98 | W. T. Hollis, Preston Station | 97 |
| J. Morrison, Henfryn | 98 | J. H. Wilkinson, Verschoyle | 97 |
| T. G. Bell, Belleville | 98 | W. Fitzgerald, Dufferin | 97 |
| J. McKellar, Tiverton | 98 | Henderson Bros., Athens | 97 |
| P. Campbell, Morewood | 98 | S. R. Payne, Warsaw | 97 |
| A. Campbell, No. 2, Ormond | 98 | Wm. Eager, Johnson's Factory | 97 |
| G. Cleall, Selby | 98 | J. L. Phillips, Brockville | 97 |
| J. Bissell, Brockville | 98 | W. Wartman, Cushendall | 97 |
| J. Hamilton, Vars | 98 | W. Cleugh, Belleville | 97 |
| G. G. Publow, Perth | 98 | J. W. Blyth, Varney | 97 |
| W. Duff, Inverary | 98 | J. Given, Belleville | 97 |
| J. Raphael, Mallorytown | 98 | A. M. Ketcheson, Belleville | 97 |
| B. Bond, York | 97½ | G. B. McLeod, Thamesford | 97 |
| J. Roberts, Allenford | 97½ | T. Stacey, Fullarton | 97 |
| E. E. Chaffee, Summerstown | 97½ | A. P. McCallum, Watford | 97 |
| Hodgson Bros., Victoria Factory | 97½ | L. Stevens, Delta | 97 |
| D. McMillan, Poole | 97½ | H. Jack, Carthage | 97 |
| T. Burnside, Belleville | 97½ | W. J. Dunlop, Trowbridge | 97 |
| J. F. Williams, Ingersoll | 97½ | J. Gay, Sine | 97 |
| W. G. Wright, Belleville | 97½ | J. Fowler, Mount Chesney | 97 |
| T. O'Flynn, Kinkora | 97½ | N. Webster, Lansdowne | 97 |
| W. D. Angus, Newbridge | 97½ | G. Jackman, Napanee | 97 |
| W. Woods, Molesworth | 97½ | Hodgson Bros., Brook Factory | 97 |
| J. C. Brintnell, Plainfield | 97½ | S. Halladay, Elgin | 97 |
| N. E. Thompson, Eldorado | 97½ | A. Shrumm, Bismarck | 97 |
| J. Latta, Trenton | 97½ | S. R. Lee, Hickson | 96½ |
| Hodgson Bros., Madoc Factory | 97½ | J. Thompson, Evelyn | 96½ |
| A. W. Mallory, Mallorytown | 97½ | G. V. De Long, Harron | 96½ |
| W. Pomeroy, Mitchell | 97½ | L. C. McInnes, Lucknow | 96½ |
| J. Brodie, Mapleton | 97½ | J. H. Stillman, Ingersoll | 96½ |
| J. Hogan, Kingston | 97½ | E. Johnson, Birr | 96½ |
| J. W. Copeland, Eastwood | 97½ | J. Dickenson, Springfield | 96½ |
| W. A. Bothwell, Woodstock | 97½ | B. Mallory, Frankford | 96½ |
| T. J. Humphrey, Hickson | 97½ | I. T. Saul, Birr | 96½ |
| J. McCann, Perth | 97½ | W. Latta, Thurlow | 96½ |
| J. A. McIntosh, Kohler | 97½ | J. Latta, Shannonville | 96½ |
| W. Morris, Avon | 97½ | D. W. Garvey, Talbotville | 96½ |
| S. Howard, Gorrie | 97½ | J. Dempsey, Fairview | 96½ |
| J. Evans, Belmont | 97½ | J. Ireland, Beachville | 96½ |
| J. S. Isard, Williscroft | 97½ | J. Mackenzie, Belleville | 96½ |
| W. Pow, Mount Elgin | 97½ | H. Clark, Smith's Falls | 96½ |
| W. J. Spry, Belleville | 97½ | J. S. Dougan, Bridgewater | 96½ |

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| | Points. | | Points. |
|---|---|---|---|
| J. Lappin, Lansdowne | 96½ | R. Groat, Georgetown | 95½ |
| E. V. Halladay, Elgin | 96½ | E. A. Sims, Devizes | 95½ |
| R. Cavanagh, Appleton | 96½ | B. Bachelor, Birnam | 95½ |
| J. H. Singleton, No. 5, Singleton | 96½ | W. S. Cook, Belleville | 95½ |
| W. Munroe & Son, Navan | 96½ | W. J. Magury, Warwick West | 95½ |
| A. E. Millson, Peebles | 96½ | A. Campbell, White Globe No. 1 | 95½ |
| B. B. Bellamy, Jellyby | 96 | R. B. Cochrane, Elginburg | 95½ |
| W. Campbell, Cannamore | 96 | W. Clark, Princeton's Corners | 95½ |
| J. Wilford, Brownsville | 96 | O. Vandervoort, Belleville | 95½ |
| J. McKelvie, Belleville | 96 | Sarah Baskett, London | 95½ |
| P. Campbell, Morewood | 96 | A. Herity, Belleville | 95½ |
| D. Gillen, Belleville | 96 | T. Naylor, Campbellford | 95½ |
| W. H. McLean, Crinan | 96 | M. Knechtel, Tavistock | 95½ |
| W. Caldwell, Drumbo | 96 | G. McDonald, Bluevale | 95½ |
| C. G. Miners, Tilsonburg | 96 | W. J. Niblock, Kingscroft | 95½ |
| J. Brodie, Mapleton | 96 | B. L. King, Railton | 95½ |
| B. J. Connolly, Kintore | 96 | W. Lloyd, Roslyn | 95½ |
| W. McIlvride, Stayner | 96 | J. McDermott, Tiverton | 95½ |
| A. McCombs, Selkirk | 96 | W. W. Harris, Rothsay | 95½ |
| P. W. Strong, Soperton | 96 | O. & R. Banks, Thamesford | 95 |
| A. Campbell, No. 2, Ormond | 96 | Coffin Bros., Villa Nova | 95 |
| H. Clark, Smith's Falls | 96 | G. A. Walker, S. Cayuga | 95 |
| G. W. Henderson, Belleville | 96 | J. G. Patterson, Conn | 95 |
| Mrs. R. McCrow, Drumbo | 96 | J. Connolly, Alsfeldt | 95 |
| W. Johnson, Belleville | 96 | W. H. Olds, Simcoe | 95 |
| G. Kerr, Singleton | 96 | J. W. Blyth, Varney | 95 |
| J. Lowry, Frankford | 96 | S. T. Wallace, Lavender | 95 |
| M. McNicoll, Belleville | 96 | J. Clark, Belleville | 95 |
| H. Morton, Belleville | 96 | R. S. Tivy, Belleville | 95 |
| W. Meiklejohn, Belleville | 96 | Sarah Dougan, Belleville | 95 |
| G. A. Boyes, Mapleton | 95½ | S. Howard, Gorrie | 95 |
| P. McIntosh, Winchester Springs | 95½ | | |

## Quebec.

| | | | |
|---|---|---|---|
| G. St. Pierre, Victoriaville | 99½ | J. N. Gaudreau, Magog | 98 |
| C. St. Laurent, St. Valère de Bulstrode | 99½ | C. Wilkins, Mansonville Station | 98 |
| J. H. Lefebvre, La Baie | 99½ | R. Wherry, Mountain Pass | 98 |
| J. D. Barrington, Ste. Martine | 99 | A. Crittenden, W. Brome | 98 |
| E. G. Welch, Farnham | 99 | Sarah Newton, Sutton | 97½ |
| T. Durnan, Landerville | 99 | C. M. Harvey, Venice | 97½ |
| E. Normand, St. Gilbert | 99 | S. Duhamel, Pigeon Hill | 97½ |
| H. Lefebvre, St. Zephirin | 99 | G. McCrumm, Iron Hill | 97½ |
| A. Macfarlane, Cowansville | 99 | W. T. Gardiner, St. Louis Station | 97½ |
| N. Vidal, Warwick | 99 | E. Deauplaise, St. Pie de Guire | 97½ |
| R. Blunt, Foster | 99 | A. Brissette, Stanfold | 97½ |
| Sarah Newton, Sutton Flat | 99 | Mrs. E. G. Welch, Farnham | 97½ |
| Mrs. Blunt, Foster | 99 | E. Proulx, La Baie | 97½ |
| J. N. Duguay, Blue Star, No. 6 | 99 | E. G. Welch, Yamaska | 97½ |
| A. Plante, St. Ours | 99 | A. S. Lloyd, Ormstown | 97½ |
| A. W. Woodard, Sutton Flat | 98½ | H. P. Sweet, W. Brome | 97 |
| C. Newton, Sutton Flat | 98½ | W. Parenteau, St. Pie de Guire | 97 |
| Mrs. W. McFarlane, W. Brome | 98½ | W. J. Sheldon, Brome Corners | 97 |
| A. Trudel, St. Prosper | 98½ | L. Gilbert, St. Ferdinand d'Halifax | 97 |
| H. P. Sweet, W. Brome | 98½ | W. J. Sheldon, Brome Corners | 97 |
| M. Toof, Sweetsburg | 98½ | Wm. Macfarlane, W. Brome | 97 |
| Mrs. A. McFarlane, Cowansville | 98½ | J. G. Wales, E. Dunham | 97 |
| J. Savard, St. Alban | 98½ | Mrs. K. L. Perkins, E. Dunham | 97 |
| A. T. Newton, Sutton Flat | 98½ | J. A. Macdonald, Athelstan | 97 |
| J. A. Plamondon, Ste. Anne de la Pérade | 98½ | C. A. Beattie, Iron Hill | 97 |
| A. T. Newton, Sutton Flat | 98½ | C. M. Willey, Abercorn | 97 |
| Mary Larose, Sutton Flat | 98 | N. Parenteau, St. Michel, Yamaska | 97 |
| Mrs. E. G. Welch, Farnham | 98 | Mrs. A. McFarlane, Cowansville | 96½ |
| T. L. Burnett, Farnham Centre | 98 | A. W. Woodard, Sutton Flat | 96½ |
| W. H. Walker, Huntingdon | 98 | T. H. Noyes, Sweetsburg | 96½ |
| J. G. Wales, E. Dunham | 98 | J. D. Leclair, St. Hyacinthe | 96½ |
| Nellie Ettershanks, Knowlton | 98 | Mrs. M. J. Tracey, Millington | 96½ |
| A. Gérin, St. Edwidge | 98 | D. Demers, St. Zéphirin | 96½ |

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| | Points. | | Points. |
|---|---|---|---|
| W. Parent, St. Elphège | 96½ | E. Rivard, St. Casimir | 96 |
| Mrs. E. M. Carter, Cowansville | 96½ | J. B. Strong, Sutton Flat | 96 |
| N. E. Clément, Ste. Anne de la Pérade | 96½ | S. Duhamel, Pigeon Hill | 95½ |
| A. Belisle, La Baie | 96½ | L. Gilbert, St. Ferdinand d'Halifax | 95½ |
| J. A. Macdonald, Athelstan | 96 | O. Lafond, Yamaska, East | 95½ |
| R. Wherry, Knowlton | 96 | E. Hamelin, Grondines | 95½ |
| H. W. Perkins, E. Dunham | 96 | Mrs. J. Hawke, Stanbridge East | 95½ |
| Addie Peacock, Sweetsburg | 96 | J. Felix, Champlain | 95½ |
| A. Macfarlane, Cowansville | 96 | E. A. Russell, Stanbridge East | 95 |
| A. C. Carter, Cowansville | 96 | A. Whitehead, Robinson Bury | 95 |
| D. O. Bourbeau, Victoriaville | 96 | A. Allie, St. Thomas de Pierreville | 95 |
| J. N. Duguay, LaBaie | 96 | E. Boivin, St. Thomas de Pierreville | 95 |
| O. Parent, St. Zéphirin | 96 | W. H. Tillson, West Farnham | 95 |
| E. A. Russell, Stanbridge East | 96 | C. Newton, Sutton Flat | 95 |
| H. O. Wales, Sutton Junction | 96 | A. Trudel & Co., St. Ubalde | 95 |
| A. Crittenden, W. Brome | 96 | A. Trudel, St. Ubalde | 95 |
| Mrs. N. Vidal, Warwick | 96 | | |

### Maritime Provinces and Manitoba.

| | | | |
|---|---|---|---|
| S. M. Barré, Ste. Anne, Man | 99 | A. Cameron, Antigonish, N.S | 96 |
| Wm. Topping, Elmbank, N.S | 98½ | J. Burgess, Murray Harbour N., P.E.I | 96 |
| D. Shunk, Ste. Anne, Man | 97½ | J. R. Moore, Morell, P.E.I | 96 |
| C. L. Tilley & Son, Richmond Factory, N.B. | 97 | C. J. Brown, Cornwall, P.E.I | 96 |
| S. M. Barré, Ste. Agathe, Man | 96½ | J. E. Hopkins, Nappan, N.S | 95½ |
| J. McKenzie, Sailors' Hope, P.E.I | 96½ | G. Burgess, St. Peter's Bay, P.E.I | 95½ |
| E. L. Head, New Perth, P.E.I | 96½ | R. H. Hood, Mt. Stewart, P.E.I | 95½ |
| C. L. Tilley & Son, Woodstock, N.B | 96 | Morell Dairy Co., Morell, P.E.I | 95 |

## CHEESE OF 1893; FLATS AND YOUNG AMERICAS.

### Ontario.

| | | | |
|---|---|---|---|
| J. Brown, Ingersoll | 98½ | Miss E. A. Hannen, London | 98 |
| S. Howard, Gorrie | 98½ | S. Howard, Gorrie | 96½ |
| J. W. Blyth, Varney | 98½ | J. W. Blyth, Varney | 96 |
| S. Howard, Gorrie | 98½ | | |

### Quebec.

| | | | |
|---|---|---|---|
| W. H. Tillson, W. Farnham | 99½ | E. Russell, N. Stanbridge | 97 |
| W. H. Tillson, W. Farnham | 98 | S. Duhamel, Pigeon Hill | 96½ |
| J. G. Wales, E. Dunham | 98 | | |

In the October competition, 489 exhibits of cheese from Canada, were recommended by the judges for awards. The following table shows the exhibits by Provinces:

| Cheese of 1892. | Exhibits. | For Awards. | Cheese of 1893. | Exhibits. | For Awards. |
|---|---|---|---|---|---|
| Ontario | 59 | 58 | Ontario | 274 | 259 |
| Quebec | 45 | 42 | Quebec | 113 | 105 |
| P. E. Island | 2 | 2 | P. E. Island | 19 | 8 |
| Nova Scotia | 5 | 4 | Nova Scotia | 10 | 3 |
| New Brunswick | 4 | 4 | New Brunswick | 4 | 2 |
| | | | Manitoba | 4 | 3 |
| | 115 | 110 | | 424 | 380 |

One hundred and thirty of these exhibits received severally a higher number of points than the highest award given to any exhibit of cheese from any other country in the same classes.

Less than 10 per cent of all the exhibits of cheese from Canada were not recommended by the judges for awards. The general excellence and superiority of the

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Canadian cheese was thus clearly established. The keeping quality of Canadian cheese—one of the points of the greatest commercial value—was also brought out impressively by 115 exhibits of cheese of the make of 1892. Of these no less than 110 carried off awards and were described by the judges (two United States experts and one Canadian) as the finest lot of old cheese which they ever examined.

The plan to secure a thoroughly representative exhibit of cheese from all the provinces has been amply justified by its success. The intention was to present a collection of cheese which would represent the output of the factories in every part of the Dominion where dairying upon the co-operative plan has been established. The word "Canadian," by which our cheese are known on the British markets, was the one which fittingly described the exhibit. While the several provinces received due credit for the number of awards which went to dairymen in them, the effectiveness of the result for creating a favourable impression among the farming classes of Europe and the cheese-eating public of Great Britain was edged and conserved by the success won for "Canadian," and Canada.

A considerable gain to Canada will come through the favourable impression produced abroad by this victory, and the dairy farmers in the different parts of the Dominion will be encouraged and stimulated to pay more attention to a further development of this branch of farming for which our country seems to be specially adapted. Cheese-making in Ontario has been a foremost industry for several years, but the reputation of the cheese from the province of Quebec was far behind that of its sister provinces. Now it is practically abreast of it.

When it is known that all of the exhibits from Prince Edward Island with the exception of those from two factories, were cheese of July make, which had not been kept in cold storage and afterwards came in competition in Chicago with the finest of August and September cheese, the success of the cheese from the Island Province—the Gem of the Gulf—is all the more astonishing and gratifying.

### BUTTER.

The judges of butter were Mr. J. R. Morin, of the firm of Messrs. J. R. Morin & Co., of Iowa, Minnesota and Nebraska, and Mr. E. A. Harris, of H. A. Hovey & Co., of Boston, Mass., and Mr. A. A. Ayer, Montreal, Que.

One hundred and sixty-seven packages of butter were sent and 27 lots were found to be entitled to awards. The judges recommended that all exhibits which received a score of points over the following be awarded a medal and diploma. Minimum of points to entitle to an award: 95 in class IV, 94 in class V, and 93 in classes I, II, and III. The following is the list of successful exhibits :—

## ONTARIO.

### CLASS V.—GATHERED CREAM.

| | POINTS. |
|---|---|
| A. Wenger, Ayton, Ont. | 95½ |
| J. A. Struthers, Owen Sound, Ont. | 95 |
| Holliday & Co., Chesley, Ont. | 94 |
| Isaac Wenger, Ayton, Ont. | 94 |
| Alex. E. Wark, Paisley, Ont. | 94 |

### CLASS IV.—SEPARATOR CREAM.

| | |
|---|---|
| Binion & Rutherford, Iroquois, Ont. | 95 |
| H. J. Hayes, Glenroy, Ont. | 95 |

### CLASS I.—DAIRY BUTTER MADE ON THE FARM FROM A MIXED HERD.

| | |
|---|---|
| Mrs. Chas. Long, Blessington, Ont. | 94½ |
| Thomas H. Mason, Straffordville, Ont. | 93 |

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## QUEBEC.

### CLASS IV.—SEPARATOR CREAM.

| | Points. |
|---|---|
| A. W. Kimpton, Piedmont, Que | 96½ |
| Alphonse Furvoy, St. Michel, Que | 96 |
| N. E. Bernatchez, Montmagny, Que | 96 |
| Z. S. Lawrence, West Shefford, Que | 96 |
| Frank Wilson, Montreal, Que | 95 |
| East View Stock Farm, Cookshire, Que | 95 |
| A. Chicoine, St. Marc, Que | 95 |

### CLASS III.—PRINTS AND FANCY PACKAGES.

| | |
|---|---|
| Mrs. M. N. Emerson, Sutton Junction, Que | 94 |
| N. P. Emerson, Sutton Junction, Que | 94 |

### CLASS II.—DAIRY BUTTER MADE ON THE FARM FROM A HERD OF ONE BREED.

| | |
|---|---|
| Walter Taylor, Cookshire, Que | 94 |

### CLASS I.—DAIRY BUTTER MADE ON THE FARM FROM A MIXED HERD.

| | |
|---|---|
| John J. Emerson, Sutton Junction, Que | 95 |
| John Dougall, Cowansville, Que | 94 |
| G. W. L. French, Island Brook, Que | 94 |
| Melville Patterson, Knowlton, Que | 93½ |
| Henry Miller, Knowlton, Que | 93½ |
| Wm. Birch, Coaticook, Que | 93½ |

## NEW BRUNSWICK.

### CLASS V.—GATHERED CREAM.

| | |
|---|---|
| P. L. Richard, St. Louis, N. B | 95 |

## MANITOBA.

### CLASS V.—GATHERED CREAM.

| | |
|---|---|
| Dr. Barnardo, Russell, Man | 94 |

The results from the butter competition, while not so gratifying to Canada as those from the cheese, are still full of encouragement and use. The whole of the butter on exhibition was judged by three eminent experts (two from the United States and one from Canada). The body of the Canadian butter was on the whole rated very high; most of the exhibits lost several points on flavour. The circumstances of the exhibition were not favourable to Canadians, by reason of the distant points from which most of the butter had to be sent—some lots came all the way from Manitoba on the one hand and from New Brunswick on the other. The defects in the flavour were mostly attributed to the use of inferior salt, or salt which had acquired foul flavours or odours by exposure to the odours from other commodities in the holds of vessels or in warehouses. This little matter was the great matter which ruled out 50 or more of our exhibits of butter which were excellent in every other respect. In future, particular care must be given by the butter-makers to prevent the salt from being exposed in any foul atmosphere, as otherwise it is liable to acquire taints and transfer them into the butter.

### GENERAL.

The most of the credit for the success of the exhibition is due to the cheese-makers, butter-makers and dairymen who took pains to provide such excellent quality in their exhibits, and who responded so generally and carefully to the appeal

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in the Bulletin. Honour and praise are also due to the leading dairymen from Canada, who assisted in the task of selecting the cheese and butter and of seeing that Canada was fittingly represented in her dairy interests at Chicago. Among these were: Messrs. D. M. Macpherson, Lancaster, Ont., president of the Dominion Dairymen's Association; Wm. Eager, Morrisburg, Ont., ex-president of the Dairymen's Association of Eastern Ontario; Wm. Bissell, Algonquin, Ont., president of the Dairymen's Association of Eastern Ontario; D. Derbyshire, Brockville, Ont., president of the Ontario Creameries' Association; Col. O. P. Patten, Brome Corners, Que., who represented H. S. Foster, on behalf of the dairy interests of the province of Quebec; John S. Pearce, London, Ont., a director in the Dairymen's Association of Western Ontario, and in the Ontario Creameries' Association. It was regretted that Mr. John Geary, London, Ont., president of the Dairymen's Association of Western Ontario, was unable to attend with the others. His colleague from the Board of the Dairymen's Association of Western Ontario, Mr. A. F. MacLaren, Windsor, Ont., was one of the judges, and in that capacity, by his expert knowledge, fairness, unfailing geniality and ability, he rendered service equally satisfactory and acceptable to the United States and Canadian dairymen. Mr. J. C. Chapais, St. Denis, Que., Assistant Dairy Commissioner, was also in attendance. Mr. J. de L. Taché, Quebec, who did much to secure exhibits of creamery butter from Quebec, was at Chicago earlier in the season. Mr. H. S. Foster, Knowlton, Que., President of the District of Bedford Dairymen's Association, who did the lion's share of the work in that province in securing exhibits, was prevented by illness from going to Chicago.

SUMMARY.

*Cheese.*

| | Exhibits. | Recommended for awards. |
|---|---|---|
| June competition | 162 | 129 |
| October do | 539 | 490 |
| | 701 | 619 |

*Butter.*

| | | |
|---|---|---|
| June competition | 43 | 13 |
| October do | 167 | 27 |
| | 210 | 40 |

The immediate effect of this sweeping achievement at Chicago will be to still further enhance the reputation of our cheese in the British markets. It will also further stimulate our dairymen to pay more attention to the home-end of the business. I estimate that the resulting improvement in the quality of cheese throughout the whole Dominion will represent an increase in intrinsic value of not less than from $\frac{1}{4}$ to $\frac{1}{2}$ cent per pound. As the exports of cheese from Canada are now over 130 millions of pounds annually, the monetary value directly resulting from the success at Chicago will not be less than four or five hundred thousand dollars. To this is to be added the permanent benefits of the acquisition of knowledge, improvement in practice and gain in prestige.

The lessons from the World's Columbian Exposition, when applied to our butter-making, will doubtless prove beneficial; and it is my opinion that we shall be able to carry forward our cheese business to still wider extension and higher attainment and at the same time bring up the reputation and the quality of our butter abreast of it within five years, if the individual dairymen give their hearty co-operation and follow out carefully the instructions which are given.



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The results from the whole matter will be of prime and far reaching value to Canada. Everything that promotes the dairying business increases the demand for labour on the farms. That helps to retain a larger population in rural districts. It includes such a rotation of crops and system of culture as will help to increase the fertility of the soil. In the largest and best sense it furthers the material prosperity of the people, and from that arises progress in all the admirable and lovable accessories and qualities of life with contentment.

## PART XI.—REPORT OF THE ASSISTANT DAIRY COMMISSIONER.

(MR. J. C. CHAPAIS.)

SAINT DENIS (en bas), COUNTY OF KAMOURASKA, P.Q.

30th June, 1893.

Professor JAMES W. ROBERTSON,
Dairy Commissioner,
Ottawa.

DEAR SIR,—According to the instructions received from you in December last (1892), I have lengthened the period covered by the present report until the thirtieth of June instant. Consequently, all my work since the first January, 1892, until the thirtieth of June, 1893, is referred to in my present report.

### SUMMARY OF MY VISITS.

During this period, I have gone through four (4) provinces of the Dominion, I have visited thirty-two counties, one hundred and four localities, and I have given one hundred and twenty-two (122) lectures. I travelled over sixteen thousand three hundred and sixty-four (16,364) miles, and I spoke to seventeen thousand eight hundred (17,800) persons. Twenty-nine (29) of these lectures have been given before eleven (11) great conventions of a district or provincial character.

I give, in the following table, the indication of the work done in each province, showing the number of lectures given in the different counties and localities of these provinces:

MANITOBA.

| Counties. | Localities. | Lectures. | Counties. | Localities. | Lectures. |
|---|---|---|---|---|---|
| Lisgar | Pigeon Lake | 1 | Selkirk | Boissevain | 1 |
| | St. Charles | 1 | | Brandon | 1 |
| | St. Eustache | 1 | | Crystal City | 1 |
| | St. Frs.-Xavier | 1 | | Elkhorn | 1 |
| | | | | Killarney | 1 |
| Marquette | Minnedosa | 1 | | Notre Dame de Lourdes | 1 |
| | Portage la Prairie | 1 | | Oak Lake | 1 |
| | | | | Pilot Mound | 1 |
| Provencher | La Broquerie | 1 | | St. Alphonse | 1 |
| | Letellier | 1 | | Somerset | 1 |
| | Lorette | 1 | | Souris | 1 |
| | St. Jean-Baptiste | 1 | | Virden | 1 |
| | St. Malo | 1 | | Wawanesa | 1 |
| | St. Norbert | 1 | | Westminster | 1 |
| | St. Pierre | 1 | | | |
| | Ste. Agathe | 1 | | Total, Manitoba | 29 |
| | Ste. Anne des Chênes | 1 | | | |

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## NEW BRUNSWICK.

| Counties. | Localities. | Lectures. | Counties. | Localities. | Lectures. |
|---|---|---|---|---|---|
| Gloucester | Bathurst | 1 | Gloucester | Pockmouche | 1 |
| | Bathurst Village | 1 | | Shippegan | 1 |
| | Caraquet | 1 | | St. Isidore | 1 |
| | Grande Anse | 1 | | Tracadie | 1 |
| | Paquetville | 1 | | Total, N. Brunswick. | 10 |
| | Petit Rocher | 1 | | | |

## ONTARIO.

| Counties. | Localities. | Lectures. | Counties. | Localities. | Lectures. |
|---|---|---|---|---|---|
| Prescott | Alfred | 2 | Prescott | Plantagenet | 2 |
| | | | | Total, Ontario | 4 |

## QUEBEC.

| Counties. | Localities. | Lectures. | Counties. | Localities. | Lectures. |
|---|---|---|---|---|---|
| Arthabaska | Arthabaskaville | 1 | Missisquoi | Sweetsburg | 1 |
| | Warwick | 1 | | | |
| Beauce | Scott | 1 | Montmagny | Montmagny | 3 |
| | Ste. Marie | 1 | | | |
| Bellechasse | Armagh | 1 | Montmorency | Chateau-Richer | 1 |
| | Bulkland | 1 | | L'Ange-Gardien | 1 |
| | St. Damien | 1 | | St. François | 1 |
| | St. Lazare | 1 | | St. Jean | 1 |
| | St. Magloire | 1 | | St. Joachim | 1 |
| | St. Philémon | 1 | | St. Laurent | 1 |
| Bonaventure | Carleton | 1 | | St. Pierre | 1 |
| | New Carlisle | 1 | | St. Tite des Caps | 1 |
| | Port Daniel | 1 | | Ste. Famille | 1 |
| Champlain | Ste. Anne de la Pérade | 1 | Nicolet | Bécancour | 2 |
| Chicoutimi | Hébertville | 1 | Ottawa | East Templeton | 1 |
| Dorchester | St. Anselme | 1 | | L'Ange-Gardien | 1 |
| | St. Hénédine | 1 | Quebec | City | 6 |
| Drummond | Kingsey French Village | 1 | | Ste. Foye | 1 |
| Gaspé | Cap Chat | 1 | St. Hyacinthe | St. Hyacinthe | 2 |
| | Fox River | 1 | Shefford | Waterloo | 2 |
| | Ste. Anne des Monts | 1 | Temiscouata | St. Modeste | 1 |
| Huntingdon | Hemmingford | 1 | Terrebonne | St. Faustin | 1 |
| Kamouraska | St. Denis | 1 | | St. Hippolyte | 1 |
| Lac St. Jean | Chambord | 3 | | St. Jérôme | 1 |
| | Roberval | 1 | | St. Jovite | 1 |
| | St. Félicien | 1 | | St. Sauveur | 1 |
| | St. Jérôme | 1 | | Ste. Adèle | 1 |
| Laval | St. François de Sales | 1 | | Ste. Agathe | 1 |
| L'Islet | L'Islet | 1 | | Ste. Julie | 1 |
| | St. Cyrille | 1 | | Ste. Marguerite | 1 |
| | St. Eugène | 1 | | Ste. Thérèse | 5 |
| Matane | Amqui | 1 | | Total, Quebec | 79 |
| | Cedar Hall | 1 | | | |
| | St. Moïse | 1 | | | |



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Before proceeding, I must add that, although I am especially charged with the French portion of the work done in your department, I have given, in order to comply with circumstances, fifteen lectures in English.

I am now going to tell you what kind of work I have done in every one of the provinces visited, following the order which they occupy in the preceding table.

### MANITOBA.

In the month of February, 1892, after having received instructions from you, through letters of the 26th December, 1891, and of the 2nd, 19th and 28th January, 1892, I made a trip through the province of Manitoba, so as to give lectures on agriculture, regarding its relation with dairying. I left for Manitoba on the 2nd of February, and returned on the 29th of March, after having passed six weeks in visiting the localities hereafter mentioned.

I arrived in Manitoba on the 8th of February, and from the 9th till the 21st, I gave nine lectures in French in the following places: La Broquerie, Letellier, Lorette, St. Jean Baptiste, St. Malo, St. Norbert, St. Pierre, Ste. Agathe, and Ste. Anne des Chênes.

I was, during this first part of my trip, in company with the Honourable Mr. LaRivière, member of the House of Commons for the county of Provencher, who was extremely kind and obliging to me and who greatly facilitated my endeavours. Mgr. Taché, Archbishop of St. Boniface, was also considerate in allowing one of his priests, l'Abbé Cloutier, to accompany me during a few days, in order to introduce me to the parish priests of the different parishes.

From the 27th February till the 6th March, I fulfilled, in this second series of lectures, the task of replacing you in the below-mentioned localities which you were expected to visit during February, which expectation you could not fulfil on account of uncontrollable circumstances. I had, therefore, to give my lectures in English in the following localities: Boissevain, Brandon, Elkhorn, Killarney, Minnedosa, Pilot Mound, Portage la Prairie, Souris, Virden, Wawanesa, and Whitewater.

I at length finished my trip by another series of lectures delivered in French, from the 6th March till the 19th March in Notre-Dame de Lourde, Oak Lake, Pigeon Lake, St. Alphonse, St. Charles, St. Eustache, St. François Xavier, and Somerset.

Since, my return, I have received numerous demands for information concerning the province of Manitoba, and I have thought it expedient to take the opportunity of the present report to give in full the reasons which induce us to recommend to Manitoba farmers the adoption of a mode of mixed culture which enables them to engage in the dairy industry, and which need not withdraw their interests from the other branches of agriculture.

#### *Wheat in Manitoba.*

As a general rule, wheat is the base of culture throughout the whole province of Manitoba. Oats are somewhat grown; barley somewhat less; cattle breeding for beef is practised to some extent, but wheat is king, and a farmer who has not 50 acres sown in wheat dislikes to own the fact. In 1891, Manitoba is reported to have produced, in round numbers, 23,000,000 bushels of wheat, 15,000,000 bushels of oats, and 3,000,000 bushels of barley.

In order to understand why wheat is so extensively cultivated in Manitoba, and also why it should be less in order to make place for other things, two sides of the question must be considered.

#### *Causes which favour Wheat culture in Manitoba.*

Here are the reasons which greatly weigh in favour of wheat culture in this province:—

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1st. The soil is one of the best constituted for the said culture. It contains all the elements needed by the plant to thrive and form a clear and hard grain; and these elements are present in abundance.

2nd. The climate is a most favourable one to promote early maturity, once the plant is eared.

3rd. The climate's dryness allows its being kept in open air in stacks in autumn, thus doing away with the vast building expense which the farmer would otherwise have to undertake.

4th. The great dryness of the soil and the absence of weeds in the ground, which is virgin soil, render it unnecessary for the present to follow the system of rotation of varied crops, as followed in the old provinces.

*Reasons why less Wheat should be grown.*

Let us now see the reasons against those enumerated, the reasons upon which is based the idea that mixed culture is more favourable to the farmer of Manitoba than the almost exclusive culture of wheat in which he is now engaged.

1st. There are in Manitoba frequent hail storms in summer, to such an extent that insurance companies have been formed to insure against the damage caused by them. If all or nearly all the farmer's crop is wheat, it generally is far more exposed to suffer from hail than if it consists in greater part of roots or fodder plants, which always suffer less from hail than wheat.

2nd. In places where the soil has been cultivated for about ten years, weeds begin to make their appearance and will necessitate before long a mode of culture which will destroy them; and in the grounds so invaded by weeds, wheat culture should have to cease, in order to make a cleaning out of the weeds.

3rd. For some years back, wheat in Manitoba is subject, and that, quite often, to smut, vulgarly known in French as *blé noir*. It is true that good remedies have been prescribed for this disease, amongst them, the use of sulphate of copper or blue copperas (blue-stone.)

Although this remedy is efficient, its use becomes burdensome as it necessitates the purchase of sulphate of copper and much work for the farmer who sows several hundred bushels of wheat, and besides, if he neglects to apply the remedy, he sees his crops much diminished in value, in consequence of the smut spreading.

4th. It often happens that, on account of the great extent of ground which he has to sow, the farmer of Manitoba, for want of time in autumn, not being able to plough all the ground he intends to sow in the spring, will plough in the spring, and often sow a great quantity of wheat after due time. In autumn, an early frost may come and a good part of the crop be injured before it is ripe. Anxious to make money, the farmer sells all the harvest which is not frozen and keeps wheat which has just been nipped to use as seed. That seed, weakened by the frost, although springing up in the field, produces plants which bear in themselves a source of weakness and which are more easily attacked by the spores of the "smut."

I ascertained this fact from a farmer of Red River, who wanting sound wheat to finish his planting, took frozen wheat to complete it. The frozen wheat produced a crop of smutted wheat, whilst there was little among the sound grain. Moreover if the farmer continues to sow such grains he will obtain degenerated and weakened wheat which will be, in future, always more or less subject to "smut." From this we therefore conclude that it is best to sow only as much wheat as can be sown in the proper time.

5th. It is beyond doubt that it is difficult for a farmer who sows many acres in wheat to sow all in the ordinary sowing time. He must therefore sow after the allotted period, and this explains the surplus of frozen wheat met with in Manitoba. If instead of sowing wheat beyond measure and out of season, grain was sown that would ripen quickly, such as barley, and then also if a part of the field was sown in mixed grains to make green fodder, the smaller area of wheat harvest would be of a better quality, and the other grains and green fodder could be utilized with profit as food for dairy cows, the fattening of cattle, the raising of pigs, all things calculated

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to bring in an increase of money to the farmers of Manitoba, if they could but reach the markets from which they are distant, with their products, the proceeds of their industry, for which they would get higher prices than for the frozen wheat they produce, at their loss, every year.

6th.—In a word, however great the richness of Manitoba soil, there will happen to it what has happened elsewhere to soils just as good. The long continued production of grain crop after grain crop has a deteriorating effect and there are new lands in Manitoba which require enriching, by manure or fertilizers in order to continue to produce good crops. Mixed culture combined with cattle-raising and the dairy industry would prevent this exhausting of the soil. Moreover we must not lose sight of this principle, that it is much easier to prevent the evil than to remedy it, and that it is also easier and less expensive to preserve the fertility of the soil than to restore it after it has lost its vigour. This is an experience, the learning of which has been a sad lesson to us in the old provinces of the Dominion.

### *Advantages of Mixed Culture.*

All these reasons must be more than sufficient to make the Manitoba farmers understand the great interest they should have in the lessening of wheat production, and this should entice them to engage in mixed culture, and in dairy industry. Everything in Manitoba favours the development of this last industry :—abundance of natural fodder, cheap production of green fodders and of varied grains which serve as cattle food, facility and cheapness in raising young cattle, production of extraordinarily rich milk, a climate the most favourable for the production of first-class butter and cheese, a fact proved by the honours carried off by the dairy products at the exhibitions of Ontario and Quebec as well as that of Jamaica.

### *Fodders in Manitoba.*

It has been suggested that one of the obstacles to the development of the dairy industry in the province of Manitoba is the great difficulty in harvesting of artifical fodders, resulting from the rigorous climate and the absence of snow to cover the fields which remain almost bare, exposed to frosts and thaws. Now in order to overthrow this objection, testing culture of different fodder plants was made at the experimental farm at Brandon, and it is proved that many fodder plants are of a possible and easy culture in Manitoba. I indicate them in the following table:—

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## TEST OF FODDER PLANTS AT EXPERIMENTAL FARM, BRANDON.

| English Name. | Botanic Latin Name. | Common French Name. | Botanic French Name. | Use. |
|---|---|---|---|---|
| Brome Grass, Canadian | Bromus Ciliatus | | Brome du Canada | Pasture, native. |
| Brome Grass, Hungarian | Bromus inermis | | Brome inerme | Meadow and pasture. |
| Clover, Bokhara | Melilotus albus | Trèfle d'odeur | Mélilot blanc | Pasture. |
| Clover, Red Mammoth | Trifolium pratense | Grand trèfle rouge | Trèfle des prés, mammouth | Meadow and pasture. |
| Clover, White Dutch | Trifolium repens | Trèfle blanc de Hollande | Trèfle rampant | do |
| Corn, Indian, Long Yellow Flint | Zea Mays | Blé-d'Inde, long jaune glacé | Maïs cultivé | Green fodder, ensilage. |
| Corn, Indian, Northern Dakota | do | do Dakota du Nord | do | do do |
| Corn, Indian, Squaw | do | do Squaw | do | do do |
| Drop seed grass, Geminated Satin grass | Muhlenbergia glomerata | | Mülhenbergie agglomérée | Meadow, native. |
| Fescue, Hard | Festuca durinscula | | Fétuque durette | Meadow and pasture. |
| Fescue, Meadow | Festuca pratensis | | Fétuque des prés | do |
| Fescue, Sheep | Festuca ovina | | Fétuque des brebis | do |
| Lyme Grass, Wild Rye | Elymus Virginicus | | Elyme de Virginie | Pasture, native. |
| Lyme Grass, Canadian | Elymus Canadensis | Seigle sauvage | Elyme du Canada | do |
| Millet, Common | Panicum miliaceum | | Millet commun | Green fodder. |
| Millet, German | Setaria Germanica | Moha | Sétaire d'Allemagne | Meadow and pasture. |
| Millet, Hungarian | Setaria Italica | Moha de Hongrie | Sétaire d'Italie | Green fodder. |
| Orchard Grass, Rough Cocksfoot | Dactylis glomerata | Foin dur | Dactyle pelotonné | Meadow and pasture. |
| Vetch, Common | Vicia sativa | Vesce-lentille | Vesce cultivée | Green fodder. |

I will add to this that besides the plants indicated in the table, common pease and oats sown together give a great abundance of excellent green fodder, and this is sufficient to settle the question of production of hay and grass in Manitoba, and to prove that it cannot be a hindrance to the development of the dairy industry.

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The few remarks which I have just written are the recapitulation of the lectures I gave in Manitoba, in the course of my visit, adding to it the principles of feeding and care of dairy cattle, which I alluded to in my report of last year and which consequently do not require repetition.

### STATE OF THE DAIRY INDUSTRY IN MANITOBA.

I shall not enter into detailed advantages which the dairy industry offers in the different and numerous districts which I visited, these indications being contained in the reports of the visit made in Manitoba by our inspectors, Messrs. Whitley and McEwan in the season of 1891, whose reports are contained in the official report of our department for the year 1892.

I shall content myself with briefly mentioning the establishments of Messrs. Barré and Mignault, at Jolys (St. Pierre), Mr. de la Borderie in St. Malo and Mr. Pelletier in Lorette, which are kept in a praiseworthy way, both with regard to the plant, buildings and materials used, as well as the quality of products manufactured in their factories. Mr. Barré has done a great deal for the co-operative dairy industry in Manitoba, and his services were recognized last year (1891) by members of the Provincial Dairy Association of Manitoba, who, although being in great majority English, elected him president of their society. Mr. Pelletier comes from a district of the province of Quebec, St. Hyacinthe, which is known for the excellence of its dairy products, and for the prosperous aspects the co-operative dairy industry now presents. Therefore Mr. Pelletier has ideas of progress which he well knows how to put in practice. As to Mr. de la Borderie, an old country Frenchman, to him is owing the advantage of, first in the Dominion of Canada, introducing in a practical fashion the packing of butter in hermetically closed boxes for exportation to tropical countries. These three pioneers of the dairy industry in Manitoba should serve as an example to those who are willing to follow their steps; for success, the necessary consequence of their works, awaits all those who imitate them.

I shall give here certain statistics on the condition of co-operative dairy industry in Manitoba, in 1891, so as to give an idea of what has been done in that line.

Thirty factories of butter and cheese have been in operation, in Manitoba, during the year 1891, representing a capital of $75,000. It is calculated that the cows contributing milk are worth $125,000. Thus the co-operative dairy industry in Manitoba, in 1891, may be valued at $200,000 without counting the value of the land or farm buildings or farm machinery.

Now, if we compare these figures with those of 1886, which are the first official figures furnished on that industry in Manitoba, we give the following result of the comparison:—

| | 1886. | 1891. |
|---|---|---|
| Factories | 5 | 30 |
| Capital invested | $9,000 | $75,000 |

Before ending this first part of my report which concerns Manitoba, I wish to tender my sincere sentiments of gratitude to Mgr. the Archbishop of St. Boniface, the Abbé Cloutier, the Honourable M. LaRivière as also the priests of the different parishes I visited, MM. Barré, Mignault, Pelletier, the editor of *Le Manitoba*, for the cordial aid which they gave me in the accomplishment of my work in visiting their province. They have proven to me that which I already partly knew, that they are wide awake to everything that might improve the condition of their fellow citizens.

### NEW BRUNSWICK.

The table of my visits shows that I have given ten lectures in this province.

The first work I had to undertake in this province was to try and convince that part of the population engaged in the fisheries, and which inhabits the localities situated on the sea shore, of the poor prospects offered them by the fishery industry in which they are engaged to the extent of excluding all other industries.

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This done, I set to work to teach them the principles of rural economy which could raise them from the straightened condition in which this fishing industry and the exclusion of all others places them. I pointed out to them the raising of cattle as the first step to take in that way.

This was my second visit in New Brunswick with the development of the dairy industry in view. I must say that I found the disposition of the French population that I visited quite open to my suggestions. Memramcook, one of the most central and well adapted places for carrying on a factory, saw this spring the opening of a butter factory. Dairymen's associations are organizing in St. Louis de Kent, Petit Rocher, Bathurst. Bathurst village is also one of the best adapted localities for the development of the dairy industry, and every thing indicates that next spring a butter or cheese factory will be open, thanks to the constant and energetic efforts of the parish priest who does all he can to forward the undertaking. Tracadie, another place, offers numerous advantages in the same way and things seem to be promising everywhere.

I advised in these places, to provide a way for the opening of factories by cultivating fields and pastures and to enlarge their stock by raising a number of dairy cattle before attempting to open too prematurely these factories which would not have at first the support they would require to keep them up.

The directorship of the *Courrier des Provinces Maritimes*, in Bathurst, contributed to strengthen these views by publishing my lectures and furnishing me with information as to the needs of each locality.

### ONTARIO.

I visited only two localities in this province, Alfred and Plantagenet, in Prescott country.

I was invited to be present at two great conventions of farmers held under the auspices of the Central Farmers' Institute and the Farmers' Institute of that county. My audience in these two localities was French-Canadian. I was obliged in these two instances to depart from my ordinary programme and give lectures on horticulture and entomology, in order to comply with the wishes and needs of those who invited me.

### QUEBEC.

As usual, my position as French Assistant Commissioner, has given me more work in the province of Quebec than anywhere else. Twenty-six counties and sixty-three localities were visited, and I delivered seventy-nine lectures.

I was present, in this province, at thirteen district or provincial conventions, apart from my visits from place to place.

I have continued to follow last year's programme, that is advocating agriculture especially as based on the dairy industry, the opening of butter or cheese factories and the organization of factory syndicates. delivering on these subjects, lectures, the summary of which, I gave in my report of last year. Moreover, I worked, especially during the last six months, to encourage the adoption of the milk paying system according to richness as determined by means of the Babcock apparatus. My lectures on this subject are a recapitulation of what is written on the question in the report of our department for the year 1891. I also worked to have the idea of butter manufacture in winter accepted, and in this, my success was illustrated by the fact that the Department of Agriculture for the province of Quebec has offered a five cents premium for November, ten cents for December and fifteen cents for January for each hundred pounds of milk converted into factory butter. More than fifty factories have worked with this view during the autumn of 1892 and winter of 1893, and are satisfied with the results obtained.

At the great conventions which I have already mentioned in this report, I gave lectures on : " The possibilities of the dairy industry," which will find room here, since it tends to show that it is really the best source of profit to the farmer. I here give this lecture just as stenographed at the annual convention of the Dairymen's association for the province of Quebec, held at Ste. Thérèse, county of Terrebonne in December last.

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## THE POSSIBILITIES OF THE DAIRY INDUSTRY.

*Mr. President and Gentlemen :—*

In my position as director of the Dairymen's Association, I have followed with much interest the course of our annual convention. I only find one fault in these conventions: I could wish that they were like the meetings of a certain club of negroes at New Orleans. A negro belonging to this club was trying to make proselytes and to recruit new members, so, among other details in the advantages offered by the club, he gave those he wished to inveigle the following one: "We have an annual meeting every quarter." (Laughter.) I feel, seeing the interest the people of Ste. Thérèse take in our deliberations, that these annual meetings might easily be made to recur trimestrially without wearying anybody.

But, since we have the pleasure of meeting each other only once every year, we ought to profit all the more by it, and endeavour to study thoroughly the grand business that forms the object of our labours.

I am about to surprise you by begging you to remount at one bound to the year 1870. That year, on a fine spring evening, the son of a farmer in that part of the province I live in, was going to bed thoroughly tired out with his day's work.

It was the beginning of May: the first duty he had had to do in the morning was to lift up from the ground three aged cows that could not get up of themselves. During the day he and his father had been at plough—the old wheeled plough—with a team of a horse and a bullock. As the plough was hard to keep in the furrow, and as the horse and the bullock did not pull together, the lad had to hold the reins; you may guess whether he was tired or not!

In the afternoon, he had amused himself with harrowing with a harrow with wooden teeth, and some of those missing. So that, the lad, when evening came, and he was just going off to sleep, passed over in his mind all the miseries he had endured in the day. Half an hour after he had fallen into a deep sleep, he had a dream; he seemed to see one of the old cows he had raised from the ground in the morning come into his room and draw near his bed. To his great surprise, the cow addressed him. As the boy had followed the commencement of a college course, he had heard people talk of that man who had made the animals of old times talk so wisely: the quaint old Lafontaine. So he fancied that this must be one of those animals that had assumed the form of his father's cow, and preserved the talent that Lafontaine had endowed it with.

The aged cow, in a tremulous voice,—and this is easy to understand, if she dated her life from the times I mentioned,—said to the lad: "My good friend, you have always been very kind to me. From your earliest infancy, instead of chevying me, or setting your dog to bite my heels, you used to come and see if, in that field crowded with thistles, I had grass enough to keep me alive. If you could steal a few armfuls of hay from the horses, that have always been better fed here than we cows, you stole enough to give me a light meal. And, this morning, instead of thrashing me to make me get up, you took me by the tail, giving me such a good spring that it put me on my legs at once. (Laughter.)

"Well, I will repay you for the kindness you have always shown me by giving you some news that will surprise you. This news was imparted to me by the good genius of cows. For you must know that cows are watched over by a tutelary genius, and this genius came to me and said: 'Now that you are at the point of death (your death is not so far off) I wish to tell you what will happen to you when you shall have passed into the body of another cow, in accordance with the laws of metempsychosis. In those days, instead of seeing cows that compel their owners to lift them up from the ground by their tails every spring, you will see cows that are the greatest pride of their masters. Instead of keeping for your use, you poor things, the vilest straw in the barn, and lodging you in the meanest sheds, people will study earnestly to find food good enough for your nourishment. And in gratitude for the kindness man will show you in those days, you will become for him the best source of profit he possesses.

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"'In those days, man will tax his ingenuity in committing to the soil the finest products for your food. The sparse blades of clover that are found casually in those bare pastures where you are compelled to pass your summers will be replaced by rich meadows of clover; for man will have conceived the idea of harvesting that seed and sowing it for your use. In those days, the meadows will be full of fine timothy-grass, which will be reserved for you, and the time will come when, by a process unknown now, but that will be discovered by the *savants* of that time, man will find means to preserve fodder green throughout the entire winter.'"

After having thus addressed him, it seemed to the youth the cow suddenly changed her bearing and even her coat. Instead of her lean carcase, he saw a cow of finely modelled shape; her coat was shining, her skin elastic, and she had every appearance of being in perfect health. Then, he awoke from his dream. (Cheers.)

In the morning he went and found his father, and related to him this curious dream. "Can you fancy? Our old cow, that I lifted up this morning by the tail, came to me during the night and talked to me in this fashion," and he then told his father what he had seen and heard. The next morning, when he entered the cowhouse, the poor thing lay dead!

I need not explain this little allegory to make you understand what I mean by it. The title of my address is: *The Possibilities of the Dairy Industry.* This industry is for us the regenerative source of our agriculture, so long in trouble. No one among you, gentlemen, doubts the truth of this. The great work we have accomplished during the last few years, the great progress made in the mode of feeding cattle and in the production of milk, suffice to show how long is the road we have traversed.

Still, it would not astonish me, in our days, if one of our improved cows were to present itself before us to show us prospects still more brilliant. Perchance, some cow, still in possession of the talent conferred upon her by the great fabulist, may come and tell us that we can do even better than we are doing to-day. But to succeed in this, we must bring to bear all our wits, so as to profit by the knowledge acquired during the last few years, and apply it to all the branches connected with the dairy industry.

The first thing to be done to enable us to march bravely along the road of progress—and this is true not only of farmers, but of all who want to succeed in the world,—is to do everything in a well considered manner. And the system of farming of us dairymen must always be carefully thought out.

There are in the world three kinds of ignorance, which are fatal to all who are afflicted with them, but fatal in different degrees. The first is that of knowing nothing at all. In this our age, there are happily, very few afflicted with this kind of ignorance, and did it exist in any one it could be easily cured.

The second kind is that of not knowing thoroughly what one does know. Unhappily, there are more people afflicted with this style of ignorance than with the other; and it is more difficult to cure; for, if it be pretty easy to convince of his ignorance one who knows nothing, it is, in general, very hard to make any one confess that he is only a *demi-savant.*

The third kind of ignorance is that of knowing other things than those it is our business to know, and to pass our time in running after chimeras, while we neglect those things that lie within our reach.

In the farmer-class we find these three sorts of ignorance. God gives His gifts to whom he pleases; but in our social condition, we ought to devote ourselves to make these three kinds of ignorance vanish, saying to those who know nothing: 'Enter our society, enter our farmers' clubs, and learn.'

We must deal more lightly with those who know something, but who only partially know it, because then as when we meet any one who thinks he knows, we must beware of hurting his susceptibility. We must instil into his mind good principles without his perceiving it, and expel the bad principles that were rampant there. As for him who knows what it is of no use to him to know, we should try to make him learn things that are really useful to him. We must teach those who are following another road than that of dairying, that the road they are following does not lead so directly as ours to the prosperity and progress of the country.

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We must always act with reason, and to reason we must think, "To act without thinking is to fire without aim," as the Spanish proverb has it. Before making any move, in any kind of cultivation, we must think it out, in order to understand if the change we intend to work is one based on experience and on principle. We must see that it is in conformity with safe practice, and to do so we must resort to the springs whence knowledge is drawn, and the springs I refer to are meetings like this one and like those of the farmers' clubs. Those are associations of farmers who come together to consult, and their results finish by brightening the intellect of the least gifted of men.

I said just now that to be able to reach all the possibilities that dairying offers, we must know how to utilize all the resources we possess in the different branches of cultivation which we are obliged to pursue if we wish to arrive at perfection in the dairy industry. The commencement must be the performance of our farm work in the most perfect manner possible; our land must be cleared of the stones that encumber it; it must be drained to rid it of the surplus water, and be levelled that the implements may have free scope for working. The best implements are always the most improved, and the most improved are always the least dear, however much they may have cost: plough, cultivator, harrow, roller, etc., indeed all the tools used in good farming, must be of the best class. The man who has a good tool can do twice as much as the man who has a bad one.

These possibilities appear too in a more striking form, in the feeding of our stock. Instead of a ration in which there was very little hay and a great deal of straw, we now have every kind of other foods which have been tried, and which lead to results, I will not say double, but five times what they used to be.

At present, in this province, we have raised the old yields of 40 lbs. of butter a cow to 150 lbs. We must know how to utilize all kinds of stuff: cotton-cake, green-fodders, prepared fodders, which formerly were unknown, but which now, when once fermented or preserved in a silo, are well suited to the wants of the cow and make her give the greatest possible yields.

And this good food that we must have for our cows, we have only been able to get because we have taken the greatest care of our manure, of our dung. We now know positively that badly preserved manure, as it used formerly to be, is not worth one-half as much as well preserved manure. And we also know that by having a cheap shelter under which the dung is safe from storms, and by enriching it with phosphate or plaster, by feeding the cattle in the best possible manner in order to enrich the dung still more, by all this we shall succeed in producing crops more and more abundant, and in securing by these means the food best suited to our cows.

Thus, one ton of cotton-cake, costing $27, gives us in dung yielded by the stock this same $27; a marvellous thing, truly, almost incredible, did not chemistry vouch for its truth. By taking better care of the dung and manure, and by having the best that science points out to us, we can grow crops five-fold as rich as formerly; and this is again one of the possibilities we have whereby to increase the products of dairying.

Let us now attend to the stock that is the source of this industry—the cows. Formerly keeping cows was considered as a make-shift. In a family, one cow was kept on in milk from the autumn to have a supply for the baby during the winter. In winter the cows ate as little as possible; in summer, they were allowed to wander about the pastures, where the burnt-up soil showed hardly a blade of grass; and this is how our cattle became a mean and degenerate race that produced no good results.

One day, in a village, now a bathing place on the St. Lawrence, the boarders had passed the night without sleep; they had been kept awake by a street-roaming pig, one of the sort that passes the year without eating. They hunted out the owner of the pig, and asked him: "Why do you keep this pig?" His answer was, "It is always good enough to drink the dish-washings that I have to give him." They used to say, once upon a time, that a cow was always good enough to eat the little food they gave her in winter, and to give a little milk in summer.

How different are things to-day! Where there were 200 cows, averaging 40 lbs. of butter a year, there are now 600, giving each three times as much milk as they gave then.

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I do not hesitate to say that, in every part of Quebec province, with the farms we possess, we can easily double and triple the number of cows, if we only knew how to improve them by the methods I have rapidly run over.

The rearing of the milch-cow is a rather complicated affair; and it is by means of rearing and selection that we have brought out the different varieties of cows that afford us profit. It is, in fact, acknowledged now that, in two or three generations, a race of cows can be so improved by feeding that they become unrecognizable. This is the universal experience.

Our cows were formerly, in general, a mixture of Ayrshires, Herefords, Shorthorns, Canadians, &c. They ate a great deal and were sometimes fat, but they never paid their way. At last, it was discovered that, by the side of these cross-breds, there was a distinct race that had developed itself side by side with them without intermixture, weighing about 500 lbs., and able to yield ample products.

We have raised the food of this to the feeding-rations of the thoroughbreds, and what is the result? It is this: not only have the cross-breds, Shorthorns and Ayrshires, been discarded, but even the pure-bred animals of those breeds. And we have registered in the herdbook of Canadian cattle, kept by the Dairy Association, reports that prove that some of these cows give as much as 14 lbs. of butter a week.

If, by wise persistent efforts, for some years, we have succeeded in getting such good results from this race, do you not agree with me in thinking that, in 10 years, foreigners will come to search after our Canadian cows as they now search after her sister of the Isle of Jersey? For, with proper food, she is as handsome and produces quite as much. We do not want a race of butcher's beasts for the dairy. And it would be wasting time to try to get cows that would answer both purposes. When a cow, like the Canadian, has given her owner the best returns for her food for a series of years, would it be more than fair to claim for her, when old, a better fate than the butcher's pole-axe? Let us be satisfied with making this cow yield this precious milk of hers, which is the source of the finest industry that exists in the province.

I have just mentioned the word "milk"; milk is with respect to the dairy industry its raw material, and therefore deserves our special attention. What I have to say about it, will not detain you long.

Science teaches us that milk is of all things the most sensitive to its environment. A crowd of once unknown germs, which cause the numerous injuries we so well know, but the source of which we were once ignorant of, microbes, bacteria, etc., have a great share in this. Nowadays, we cannot have a slight head-ache, without fancying it is the work of a microbe, the microbe of the influenza (*grippe*), of the typhoid fever, of the cholera-morbus; and even a common cold is laid to the charge of a microbe.

What are they, these microbes? The tiniest of beings; only visible under great powers of the microscope.

The first way to get rid of them is cleanliness; and I do not mean such cleanliness as makes us *see* no dirt, but that sort that is determined that no dirt shall exist in its domains. How often have I seen patrons bringing milk to the factory in dirty cans, in which the milk stank! Still, the, milk, to look at it, was clean. In the morning, the can that held the butter-milk, was emptied, rinsed with cold water, fresh milk was put into it, and it was supposed to be "all right."

But it was no better than what was done by the two Hebrews who had just landed at Montreal from an ocean steamer. Having no work, they went to try to get some from the German consul. The consul's clerk, when they entered the office, said to them: "If you want to see the consul, the first thing you have to do is to change your shirts; he will not receive you in that state." The two tramps went out, and very shortly returned in exactly the same condition. "But I gave you notice," said the clerk, "that the consul would not receive you unless you changed your shirts." "Well," replied one, "we have changed them; I took Samuel's and Samuel took mine." (Laughter.)

These folks evidently knew nothing about what real cleanliness means; and there are some of our folks who do not seem to know much more about it than they.

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If there is no dirt to be seen on their hands, or on the implement they are using, it is all right. They seem to have neither smell nor taste; in fact, they seem wanting in many senses that are the endowment of our race.

Well, gentlemen, milk is a thing that must have the greatest cleanliness observed in dealing with it; but that is not all. Sad to say, I must state that, in our province, one of the things that make the perfection of dairying difficult of attainment, our own fault, one of the worst things we have to deplore in the dairy industry is—I may mention it, for we are all *en famille*, and even if we should speak of our faults, that can offend nobody—well, it is, that we are in the habit of adulterating our milk.

There is a substance that costs but a trifle, and is very easily mixed with milk; I mean *water*. People are led to put great quantities of it into their milk.

Another thing they are inclined to despoil their milk of. Some one has said: "Milk is a thing on which many things have been written, but the best article I ever saw on milk is cream." Cream is one of the things that tempt the farmer the most severely. I, for my part, try to make my cows yield as much cream as possible; the richer in cream the milk I send to the factory is, the more satisfied am I. But there are people who when they see plenty of it, skim off some. They say: "There is no harm in it," no, it is to make butter. Evidently, this is not a respectable proceeding.

Unfortunately, in some parts of the country, dishonest patrons are so numerous, that it may be said of them what was said by the following epitaph on the tomb of a lawyer: "In memory of a lawyer and of an honest man." On seeing this epitaph, a visitor exclaimed: "What on earth did they mean by burying two men under the same epitaph?" I should not be surprised one day, if at the sight of this epitaph: "To the memory of a patron of a cheese factory, and of an honest man," passers-by were to fancy that two distinct persons were there interred. (Laughter.)

But I hope this will never happen. There are enough of the class I have just been speaking of, who, rightfully or wrongfully, have lost their reputation, without adding another class. I trust the lawyers who are present will not feel bitter against me for this remark; for I was a lawyer myself, before I was converted and became a farmer.

Butter is one of the most delicate products of the dairy: it requires the greatest care, not only to make it good, but to keep it so. Formerly, it was unfortunately not uncommon to see butter of such a quality, that when the coffee at breakfast was too weak, it had only to be put near the butter to make it stronger. Now, things have altered; we make better butter than formerly; but even now it is not perfect, and you know that perfection in everything connected with the possibilities of dairying must be sought after.

Take the example of Denmark. Formerly Denmark produced but little butter, and that very bad; and now it commands the European market. In spite of some less favourable circumstances in which we find ourselves, we can succeed just as well as Denmark; and it is to that success that we must bend our efforts.

You heard Mr. Ayer yesterday illustrate the precautions to be taken not only as to the making of good butter, but also in packing it. He told us how fanciful the dealers are; for really these are fancies. If the tub is not as clean as it might be, even if the butter in it is very clean, they make us lose a cent. But this explains itself: it is the nature of man to be fanciful. We have the beautiful, the good, and before all we search out these abstractions by the senses, by the eyes. For it is the eye that gives the first indication of what is good, or bad.

Take then to market an article that cannot be found fault with, and the only way of having such an article of butter is to make it by the best rules, by the best processes that are taught us in our meetings.

It is not my part, in speaking of the possibilities of dairying, as I am now doing, to enter into details. I simply show the points to which our attention should be directed, if we desire to attain the very highest degree of perfection in the business of which we are the promoters.

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Up to the present time, butter has been only a summer product in this province; it was only by chance that any was made in winter. Now, things are changing: our attention has been drawn to the fact that we are situated in the best possible circumstances for the manufacture of winter butter for exportation; and there is now a movement going on to induce the proprietors of cheese factories to convert them into creameries in the winter months. Our government has just set a generous example, by offering 5, 10 and 15 cents per 100 pounds of milk taken to the factory during November, December and January, months in which butter is proposed to be made. Every one must be anxious to profit by this.

It may be said, this year, that here is a thing but little understood: but next year, I trust we may say that winter butter-making is spreading rapidly and is yielding good returns.

What a difference from former days! I described to you the condition of the cow of 22 years ago, and her present condition. To-day, during winter—instead of doing nothing, boarding out, with very bad board too, as it used to be—the cow, I say, gives as much profit in winter as in summer, if her master knows his business. If the factories close in November, if there is no creamery near us, we will open small dairies for ourselves, make our cows give plenty of milk, milk producing butter worth 25 cents a pound. And the places where this is being done are very numerous.

But we want more than this; we want the making of winter butter to become one of our habits as much as the making of cheese in summer. By this, by making butter in winter, and the finest possible export-cheese in summer, we shall have attained the maximum of production in the dairy industry.

I told you that to-day our cheese was about to win prizes on the neighbouring market. This happened two years ago, and Toronto was the stage on which it was given us to compete with the rest. This "French cheese," which people chose to designate by hard names, will be our glory, and the province of Quebec will benefit by it in a special manner.

To perfect ourselves up to this point of dairying, it took a great deal of study, and we, the members of the Dairy Association, had to carry on this study. We did it conscientiously; we laboured with all our strength. We had among us valuable men, men of science, who came to our yearly meetings charged with fresh discoveries, with improved methods, that promised better results every time. And the results we have reached to-day give us the finest prospects for the future.

Honour to those devoted men who have given up their time to the progress of this grand industry! I trust that those who hear me will do justice to the men who have done so much for the country. (Applause.)

We thought that one of the best means to promote the interests of our dairy industry was the spirit of association. This industry, as it exists at present in this province, cannot be carried on, on such a large scale, except by co-operation, that is, the combined action of all the farmers united in associations of cheese factories and creameries, where each takes his milk to be made up. These are public places, where people meet together to labour or to make others labour in common for the production of an article, the offspring of their own industry, in order to obtain from it the best results.

We formed syndicates of factories that the different factories might unite, form strong associations between themselves, with a special view of engaging inspectors to enable them to make real progress in their business.

We have in prospect another great association; one that will bring together all the local societies: the syndicate of farmers. It is, though still in its infancy, already sanctioned by the legislature. The society will permit all farmers, whatever be the state of their means, by subscribing $1.00 a year, to benefit by the knowledge and experience of each other, and will specially enable them to sell, on good terms, the produce they have to dispose of, without fear of foreign competition, and above all, without fear of speculations of which they are sometimes the victims through the acts of those who come to buy their goods. In the farmers' clubs, we have centres of instruction, whither all can come to imbibe knowledge, and with the aid of all these societies, by means of co-operation, we are certain to obtain finer results than we have ever dreamt of.

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And now, to look a little farther, what has this dairy industry, of which I have been speaking so much, in reserve for us? Well, here it is: we were told at first that this industry if carried out *à outrance*, as it was suggested, might overload the market. Now, we know that we only export to England 42 p.c. of the cheese and 2 p. c. of the butter she consumes: I think we need not be afraid of overloading her market. But there is another thing: if we are asked to push the dairy industry to its extreme limits, it is not only because it tends to produce plenty of milk and other dairy products, but because the practice of this business will compel us to throw aside routine, to give better food to our cattle, to improve all our products, and to devote such attention to farming in general, that I fear not to say that, in 20 years from the present time, the province of Quebec will be in a position to produce wheat as it used to produce it 40 years ago. For we shall have restored to the land all its fertility, all its powers. We shall then begin to rear beasts for the butcher, and to grow grain, if the markets for butter and cheese are overloaded. We shall have restored our farms to the condition they were in when they were first cleared.

These then are the prospects I see before me; this is what I hope for; it is this the young generation will see; and this it will owe to the reiterated efforts of the men of this generation.

But, gentlemen, we must not go to sleep over this fine prospect; he who comes to a standstill on the road of progress is, in reality, slipping backwards, and for this reason: because the man who is with him, while he himself is staying behind, continues to advance. It is a providential arrangement, that when once we have entered upon the road of progress, we cannot but pursue it.

Thus, we are obliged constantly to study new methods, and new implements, in order to keep up with the times; and it is only by means of persistent inquiry and constant work that we can make sure of realizing these fine prospects.

In conclusion, allow me to say a word to the young folk who have listened to us so attentively, and have even begun to imitate us.[1] You know that the farmer, if he wants to have good things in his garden, must, to start with, secure good seed.

He begins by making hot beds, where his plants are to start. He prepares the land, cuts up all the weeds which might feed at the expense of the young plants. He introduces artificial heat under his hot bed, in the ground, and then waits for the Almighty to do his share.

Later on, these plants are drawn and transplanted into cold frames, that is, into frames a little cooler than those in which they had previously been, but better suited to the plants under their then state of growth.

Lastly, when the plants have by degrees become accustomed to their final abode, they are set out in the garden, protected in every way from the attacks of insects, and before long they transform themselves into superb products.

Well, gentlemen students, you are the seed of the nation. You are here in a hot bed, so to speak, where intelligent gardeners bestow on you all the care and culture you require to become what you ought to be. Later, you will be placed in cold frames, called universities, special schools. And lastly, when you leave them, full of vigour, you will find yourselves in that fine garden, the province of Quebec, where you will produce the fine fruit that is rightly expected from you, after the care that has been lavished upon you. (Cheers.)

One thing against which I must forewarn you in the position you occupy, is this: formerly, and not very long ago, there existed a strong prejudice against learning; it was thought that a man of learning must become an advocate, a notary, a professional man of some kind.

A few years ago, an educated man, who devoted himself to farming, would have passed for the least sensible man in the world. Now, this is rather different. You have perhaps no idea,—and yet you might have gained some idea of it during the last few days,—of the enormous amount of information a farmer stands in need of.

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1 To understand this passage in M. Chapais's address, we must remember that the convention was being held in the great hall of the College of Ste. Thérèse, and that the pupils of the college, during playhours, had started a convention of their own, imitated from that whose sessions they had been attending.

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I will go further: I will say that a farmer needs more knowledge than any one, if he is to excel in his business. Study physical science, chemistry, all the exact sciences, and not a day will pass, in your life as a farmer, in which you will not find the benefit of them.

Who are the men who, without having the strength of many others, advance the art of cultivation? They are the learned men who, like you, have passed years on the benches of colleges, and who are now the glory and boast of the agricultural class. I reckon on you, and I place among the "possibilities of the dairy industry," the hope that there will be many among you who will devote themselves, to this grand industry the information they shall have acquired here.

* * * * *

I have given some attention to the selection of cheese and butter for the Columbian Exhibition, and just now I hear of the success of our exhibition in that line at Chicago.

I have given in several places a lecture on the production of winter milk, of which the following is pretty much the substance as stenographed at one of the conventions mentioned above.

### PRODUCTION OF MILK DURING THE WINTER SEASON.

*Summary.*—General considerations; change of the period of the calving season; allowance of food to the cows; stabling of the cows; light; ventilation; good temperature; cleanliness; water in stable; necessary conditions for the production of good butter in winter season; conclusion.

*Mr. President and Gentlemen:*

Fifteen years ago the Canadian farmer caused his cows to calve on the 15th May and allowed them to dry up on the 15th November. During six months of winter he fed his cows without remuneration, and, although he gave them but poor fodder, he was at a loss during six months. That, with other reasons, brought on rapidly the ruin of the farmer.

*General Considerations.*

When the road to ruin is apparent the farmer, as a drowning man, calls for help and looks out for a way to save himself. Happily his cries have been heard and a helping hand has been given him and theoretical, well thinking, and devoted agriculturists came to his rescue and have been able to rescue him from the damaged vessel, the cause of the wreck, and tender him the helping hand that enabled him to save himself. Those agriculturists told the unfortunate castaway: 'It is the milk industry, too little known and badly practised, which has brought on your ruin. Well, it is that same industry, well understood, that is going to save you.' And after having made that promise they have kept it. It is to complete the almost certain salvage of the farmer that these agronomists, to-day, endeavour to convince them that the milk industry must be continued the year round, and not only during six months. To cause the cow to pay her board with her milk during the winter, as she paid it during summer, as formerly, this is the rescue—and that helping hand—the Government of the province of Quebec has generously tendered to the farmers, by offering him a bonus for the milk made into butter during the winter.

The problem to be solved to obtain perfection in the practice of the milk industry consists, therefore, in making cheese in summer, for which we have always a ready market, and to make butter in winter, another product for which we can easily find a market.

I have been intrusted to explain before the members of the great and useful congress now assembled the theory of the production of the milk and the making of butter during the winter. I shall lay before you in a few words the special principles governing that theory, which is only, as I will now explain to you, the application of the practice already followed by a number of progressive farmers in our province.



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### *Change in the Season of Calving.*

The first thing a producer of milk, during winter, must do, is to alter the date of the calving of the cows according to season—in the province of Quebec to-day, it is the general usage to cause the cows to calve in the spring. Therefore, to secure a good production of milk from a herd during the whole year it is necessary that the cows should calve at various times in the year—some will be made to calve in the spring, others in summer, and a certain number in the fall. It is necessary to act thus for two reasons, first, because it is the only way now to be, at certain times of the year, with cows on the eve of calving and giving no milk and next because it is well known, to-day, that to produce, during the winter, butter having that peculiar flavour, so much sought, called almond flavour, it is necessary to have the milk of new calved cows, at least for the part of it. And if it became necessary to choose between fall and spring as the calving season, when it is time to begin the production of cheese in summer and butter in winter, it would be better to prefer the fall. It is easier to keep up the supply of milk of a cow during winter by proper nourishment, when she has calved in the fall than when she has calved in the spring, and besides, although a cow has long been calved in the spring, the new grass of the month of June causes her to give a fair quantity of milk during the summer.

### *Feeding of the Cows.*

The only thing the producer of milk during winter must attend to, is the proper feeding of the cows, according to a system tending to increase the secretion of the milk. Now this system is easily put in practice by means of ensilage, which gives the farmer the feed necessary for his cows during the entire winter, and nearly as good in quality as the summer grass. The chief point to be observed in the feeding of the cows giving milk, is to give them a watery food rich at the same time causing activity in the production of the milk. All sound forage is good to give to milch cows, taking as a principle that by chopping and maceration, a beginning of fermentation, it is made easily assimilable to the cow who is to digest it. The ensilage fodder offers that condition in the highest degree and that is the reason it is so much recommended for milch cows. We are now opposite two distinct systems of feeding during winter. One consists in taking the greatest profit from the alimentary substances such as hay, straw, chaff, grain, roots, at the command of the farmer nearly everywhere. The other to make a special culture to produce a special alimentation. This culture is the sowing of forage plants to use as ensilage to be used afterwards as the base of alimentation. Those plants preserved in the silo and which are called ensilage, are given to the cows mixed with other alimentary substances.

It is laid down in principle in the first system of feeding that all dry forage must be chopped and made more assimilable by damping, maceration and fermentation; when in that state, grain which must always be ground is added, and as a condiment a small quantity of salt.

In the second system the prepared forage as above stated, is replaced partly by ensilage to which is added what is left of dry chopped forage and other food mentioned above to complete the ration.

For both systems the farmer, who desires to obtain the largest possible return not only in milk, but also in manure, which is of the greatest importance to him who knows that the value of manure varies according to the quality of fodder fed to the animal that produces it, is advised to add to the alimentary substances provided by the farm, linseed or cotton cake to enrich the ration and attain the maximum production.

Trials have demonstrated that for a cow of 725 pounds, the average weight of the Canadian cow of our province, the two following rations are sufficient to enable the cow to give an average of 15 to 20 pounds of milk per day, in a stable with a temperature of 66° Fahrenheit.

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| | | |
|---|---|---|
| First ration of ensilage food: | | |
| Ensilage | 13 | lbs. |
| Chopped hay | 10 | do |
| Chopped straw | 2 | do |
| Cotton-seed meal | 1⅜ | do |
| Bran | 1⅜ | do |
| Second ration, chopped and fermented forage: | | |
| Hay, chopped, and fermented for 48 hours | 10 | lbs. |
| Straw do do | 10 | do |
| Bran | 5 | do |
| Cotton-seed meal | 3 | do |

*Stabling of the Cows.*

The third thing that a producer of milk, during winter, must pay attention to, is to have a good building to winter his cows. To make him understand what I am going to say on the subject, I will put two axioms, the correctness of which is recognized by all theoretical agriculturists as well as by breeders: Uncleanliness breeds disease; cold stops the production of milk.

A stable must have five qualities to be considered as a model. It must be lighted, the air must be pure, temperature good, perfectly clean, and in it must be found a handy system to water the cattle with abundance of clean, pure and temperate water.

*Light.*

One word on each of the qualities required in the stable. The sun is the generator of life. All who live or exist, man, animal, plant, need the sun and its beneficent light, to be healthy and in good condition of life. This is proved by the fact that the men or the animals who live in darkness have their blood impoverished and gradually weakened, and also by this fact that plants growing continually in the shade grow thin and weak and show accidents of growth altogether anomalous.

*Pure Air.*

Pure air is of first necessity for everything that lives. Air in penetrating the lungs serves to purify the blood carried to all the internal economy of the animal. If pure it brings to the animal health, if vitiated it causes serious diseases and often death. It is useless to longer insist on this score. If there are unbelievers on this subject let them be imprisoned for half a day in a room where lies an animal in putrefaction. On coming out of that place they certainly will have faith.

*Good Temperature.*

It is meant by good temperature in a stable, that which is not higher than 66° and not lower than 54° Fahrenheit. A few degrees above or below that may still be accepted but they should rather be avoided.

Good air and temperature necessary can be had in a stable by ventilation which to be perfect must be constant and well regulated. Therefore ventilators are indispensable in all well kept stables and so constructed that their draught can be increased or diminished at will.

The question of temperature is important not only on account of the health of the animal, but also for the profit of the farmer. In fact, it is well known that the more an animal is kept in the cold, the more it eats and between 32° and 66° the difference may be 30 per cent; that is a cow which would have enough of one bundle of hay in a temperature of 66° would require two in a temperature of 32°. It is also well proved that a cow which is suffering from cold soon ceases to give milk.



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### *Cleanliness.*

Cleanliness consists not only in appearance but in reality. The good ventilation and the normal temperature above indicated strongly aid in the maintenance of strict cleanliness in the stable and are its first elements. But there is a great deal more to do to secure it. Cleanliness must bear on a scrupulous carrying off of the excrements, both solid and liquid of the animals, which must be carried to a place where their emanations and their characteristic odour of ammonia cannot invade the stables. During the time they are in the stable between the hours of cleaning, these emanations are lessened by throwing superphosphate or plaster on the alleys to prevent the waste of ammonia. Care must be taken that insects, such as spiders, and chiefly lice, do not take possession of the stable, and to succeed in that a repeated sweeping is necessary, not only of the floors but also of the walls and ceilings and twice a year the walls should be whitewashed with a mixture of carbolic acid and whitewash. It is also necessary to empty regularly the mangers, the troughs, and clean them often. Finally the animals themselves should be curry-combed, carded and brushed often to carry off the dirt which has mixed with the hair, closing the pores of the skin, preventing the secretion and keeping the animals in a bad state of uncleanliness, and also in an unhealthy condition.

### *Water in the Stable.*

Finally it is important, that if we wish that a cow should give milk, we must give her, over and above what I have first mentioned, an abundance of good water. For the reasons I have given above in speaking of temperature, care must be taken not to give it too cold, for if it is too cold it forces the cow to eat much more and besides causes her to dry. The water must be of the same temperature as the stable. It is necessary that it should be pure; for dirty or unwholesome water immediately imparts a bad quality to the milk of the cow. It must not be forgotten that it is important that the cow be allowed to drink when she is thirsty, in lieu of drinking only at fixed hours for the convenience of the farmer and not that of the animal. From what I have said, it is evident that the custom followed in many places of watering the cows outside at the spring or at the river in winter is hurtful in every way. It stops the secretion of the milk in the cow that is milked during winter, causes chills and brings on miscarriage of the cows with calf, and is a source of useless expense of fodder to the farmer. The strongest reason given for this habit is that it gives the cows exercise, exercise which it is claimed is absolutely necessary to keep them in healthy condition. I will answer to this reason, by proving that it is founded on false principles. In fact it can be affirmed that the cows do not need exercise during winter to remain in good health, provided the stable is what it ought to be. Since I can remember, I know of a stable, far from being a model, where the cows have been in constant seclusion without being turned out from the 15th October to the 15th May every year, and in which, however, there never has been, for nearly three years, a single case of miscarriage, of difficult calving or of sickness, other than cases of accident, and I could mention a number of other stables where things are in the same condition.

### *Necessary Conditions for Making Good Butter During the Winter.*

I have pointed out very nearly all the conditions required to make the milk industry a paying industry in winter, to wit: the means of having milk in a profitable manner. Before I come to a conclusion, I have only to say a few words on the manner of keeping the milk to secure the largest profit in winter. It is acknowledged that the butter made in winter with the milk produced in the conditions I am going to indicate, is an excellent butter for export. A trial has been made last winter in connection with our department and the results obtained are conclusive. It only remains to put them in general practice.

To produce good butter in winter, there are certain conditions to be fulfilled. Besides those I have already given above the most important is the production of

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good milk; it is necessary to have at least in part, the milk of fresh calved cows, to produce a quality of butter having a perfect aroma. The second is that strict cleanliness must be attended to in the manner of keeping the milk. The cold season in the winter prevents the keeping of the milk in places which can suit well in summer but where it would freeze in winter before producing the cream. This often causes the housemaid to keep it in a room inhabited and heated, but where the air is far from being pure. It is clear that milk kept under these conditions cannot produce good butter. The safest way to obviate this inconvenience is to have for the winter a dairy the same as in summer and have winter dairies fitted up in such a way as to be able to skim the milk with the centrifugal machine before it freezes.

It is a certainty, based on experience, that butter made under these conditions will find a remunerative market for the producer.

### *Conclusion.*

In concluding this address much shorter and more condensed than it ought to be to treat properly this subject, I insist on the importance there is, for the farmer producer of milk, to do all that is possible to produce milk all the year round; I will chiefly insist on a point at present indisputable, in favour of the production of milk during winter. It is this, that the best milch cow does not, in fact give the maximum of milk which she can produce in twelve months, unless she gets all the year the maximum of food fit for the production of milk, which she can assimilate and that she is milked dry during the whole of that period. This maxim that a farmer should write in large letters on his stable door is so true, that those who are convinced of its truth have put it in practice, and I can guarantee, I being one of them, that they have ascertained that it is not unusual to meet, principally among subjects of the Jersey and the Canadian breed, its sister, cows it is impossible to drain before the period of calving. This I mention to answer one objection I have often heard against the production of milk in winter. The drift of this objection is that cows milked all winter do not give much milk the following summer. This objection is true only as to the cows who have a poor pasture in summer or who during winter have been fed on very little except straw. It is to be hoped that before long this kind of cow will have ceased to exist and that in a few years it will be found as easy to make butter in winter as to manufacture cheese in summer.

* * * *

In January last, a great convention of farmers from the province of Quebec was held in the city of Quebec, under the auspices of the Dairymen's Association. I was requested to help in the organization of this Congress and I did so in every way possible, especially in all that concerned the Dairy Industry. I also gave to this work all the time I could. Having been invited to lecture before this said convention of farmers, you have been able to judge for yourself the good results it must necessarily produce. All the important questions now under consideration were discussed at this Convention, and I am certain that the time which I gave to its organization will produce as good results as my other efforts in this province.

### *Work Concerning all the Provinces.*

Besides the special work done in every province, I had to give a great deal of time to the translation of different reports for our department, to the attention to a correspondence which becomes daily more and more extended, and to the work of forwarding information which is asked from all sides and which necessitates sometimes voluminous memoranda as well as thought and study. In fact, the amount of work that claims my time is increasing from day to day and I can say, that just now, it is impossible for me to accept all the invitations that are tendered me to lecture in different places. I had to put aside at least forty of these demands for want of time. Having no secretary, the work accumulates in my office during my frequent absences and I should require a lengthy period between each trip to attend to even the most urgent demands.

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I had to give, during the last eighteen months which are the object of the present report, considerable time to my lectures, the time employed for my trips having been much greater on account of the great number of miles covered and the great number of lectures given.

A glance over the following comparative tables, indicating the work done during the first twenty-one months which were the subjects of my two first reports, and the last eighteen months which are the subject of the present one, will give an idea of what I had to do and the increase which the future promises:—

| | Counties visited. | Localities visited. | Lectures given. | Number of auditors. | Miles travelled. | Average of auditors. |
|---|---|---|---|---|---|---|
| From April 1, 1890 to 1st Jan., 1892. | 51 | 92 | 99 | 13,150 | 11,797 | 132 |
| From 1st Jan., 1892 to 1st June, 1893. | 32 | 104 | 124 | 17,800 | 16,364 | 143 |

I am happy to state in finishing this report that a great progress has been made everywhere as far as the dairy industry is concerned, and the proof of this progress can be found in the great development of the syndicates in the province of Quebec where there were but ten in 1891-92 against thirty in 1893; in the opening of winter butter factories of which I had not to speak in my last report, and which now number nearly fifty; and also in the payment of milk according to its value in fat, a method followed in only one factory in 1891, and now followed in about forty factories in the province of Quebec.

This progress is a great source of encouragement for those who, by their efforts, contribute to it.

I have the honour to be, sir,
Your obedient servant,

J. C. CHAPAIS,
*Assistant Dairy Commissioner.*

## PART XII.—REPORTS OF SUPERINTENDENTS OF EXPERIMENTAL DAIRYING.

### (1) Report of J. A. Ruddick.

To Prof. James W. Robertson,
Dairy Commissioner,
Ottawa.

Sir,—I have the honour to submit my report of work done as one of the superintendents of dairying on your staff for the year ending 30th June, 1893.

The work overtaken by me during this time has been so varied that I shall present the report thereon under the following heads:—

I. Experiments in cheese-making at the Perth dairy station.
II. Winter butter-making.
III. Meetings.
IV. Miscellaneous work.

#### EXPERIMENTS IN CHEESE MAKING AT THE DAIRY STATION, PERTH, ONT.

The work undertaken here was in reality a continuation of that which was commenced in 1891 and briefly reported upon in the Dairy Commissioner's Report for 1891-92. Investigations were carried out along the following lines.

I. To determine the quantity and quality of cheese made from milk containing different percentages of fat.
II. The effect of high *vs.* low cooking of the curd.
III. The effect of setting the milk at different degrees of ripeness.

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Considering that the results of the first named experiment would throw a much needed light on the question of "paying by test" at cheese factories, special attention was given to this particular experiment, by repeating it oftener than any of the others. Altogether seventy-five tests were made, and carried out as carefully as possible.

It should be remembered that we had to contend with all the difficulties usually met with by the cheese-maker in any ordinary factory, and the results given will apply in any cheese factory.

I. *To determine the quantity and quality of cheese made from milk containing different percentages of fat.*

Table No. 1 gives the details of all the tests made in this experiment. The weights as given under the head of *green* cheese are those taken as the cheese came from the press, while *cured* cheese refers to the weighing made when the cheese were three weeks old. Of course cheese are not fully cured at that age, but that is about the length of time which elapses before cheese are weighed for market in the ordinary course of business during this season of the year (June, July and August): hence the reason for adopting that stage for the second weighing.

TABLE I.

| Date. | Lbs. of Milk. | Specific Gravity. | Per cent of Fat. | Lbs. of Fat. | Lbs. of Green Cheese. | Lbs. of Green Cheese to 1 lb. of Fat. | Lbs. of Cured of Cheese. | Lbs. of Cured Cheese to 1 lb. of Fat. | Lbs. of Milk per lb. of Cheese. | Lbs. of Cheese per 100 lbs. of Milk. |
|---|---|---|---|---|---|---|---|---|---|---|
| June 17 | 1377 | 31·9 | 3·09 | 53·70 | 141·25 | 2·63 | 138·00 | 2·56 | 9·97 | 10·02 |
| do 17 | 1485 | 31·7 | 3·04 | 50·29 | 137·50 | 2·73 | 134·00 | 2·66 | 11·08 | 9·02 |
| do 17 | 1333 | 31·8 | 3·02 | 42·65 | 122·75 | 2·87 | 119·50 | 2·80 | 11·15 | 8·96 |
| do 18 | 1400 | 32·0 | 3·95 | 55·30 | 149·25 | 2·69 | 145·00 | 2·62 | 9·65 | 10·35 |
| do 18 | 1400 | 31·8 | 3·06 | 50·40 | 136·00 | 2·69 | 133·50 | 2·64 | 10·48 | 9·53 |
| do 18 | 1400 | 31·9 | 3·04 | 47·60 | 135·25 | 2·84 | 132·25 | 2·77 | 10·58 | 9·44 |
| do 23 | 1300 | 32·7 | 3·08 | 49·40 | 132·25 | 2·67 | 129·50 | 2·62 | 10·03 | 9·96 |
| do 23 | 1400 | 32·7 | 3·45 | 48·30 | 134·00 | 2·77 | 131·00 | 2·71 | 10·68 | 9·35 |
| do 23 | 1400 | 32·5 | 3·04 | 47·60 | 134·00 | 2·81 | 131·25 | 2·75 | 10·66 | 9·37 |
| do 25 | 1300 | 31·9 | 3·09 | 50·70 | 137·50 | 2·71 | 134·75 | 2·65 | 9·64 | 10·36 |
| do 25 | 1400 | 31·9 | 3·03 | 46·20 | 136·50 | 2·95 | 133·00 | 2·87 | 10·52 | 9·50 |
| do 25 | 1400 | 32·6 | 3·02 | 44·80 | 133·25 | 2·97 | 129·50 | 2·89 | 10·81 | 9·25 |
| do 30 | 1300 | 32·1 | 3·09 | 50·70 | 135·75 | 2·67 | 131·75 | 2·59 | 9·85 | 10·13 |
| do 30 | 1400 | 31·6 | 3·05 | 49·00 | 135·50 | 2·76 | 132·00 | 2·69 | 10·60 | 9·42 |
| do 30 | 1400 | 31·9 | 3·04 | 47·60 | 135·00 | 2·83 | 131·50 | 2·76 | 10·64 | 9·39 |
| July 5 | 1300 | 32·3 | 3·09 | 50·70 | 135·25 | 2·66 | 131·25 | 2·58 | 9·90 | 10·09 |
| do 5 | 1400 | 32·0 | 3·08 | 53·20 | 141·50 | 2·65 | 138·00 | 2·59 | 10·14 | 9·85 |
| do 5 | 1400 | 32·1 | 3·05 | 49·00 | 134·25 | 2·73 | 131·00 | 2·67 | 10·68 | 9·35 |
| do 6 | 1300 | 33·0 | 3·06 | 46·80 | 131·50 | 2·80 | 127·75 | 2·72 | 10·17 | 9·82 |
| do 6 | 1400 | 32·9 | 3·05 | 49·00 | 136·50 | 2·78 | 132·75 | 2·70 | 10·54 | 9·48 |
| do 6 | 1400 | 32·8 | 3·04 | 47·60 | 133·00 | 2·79 | 128·50 | 2·69 | 10·89 | 9·17 |
| do 8 | 1300 | 32·3 | 3·08 | 49·40 | 129·50 | 2·61 | 126·00 | 2·55 | 10·31 | 9·69 |
| do 8 | 1400 | 32·3 | 3·06 | 50·40 | 135·00 | 2·67 | 131·25 | 2·60 | 10·66 | 9·37 |
| do 8 | 1400 | 32·2 | 3·04 | 47·60 | 130·25 | 2·73 | 125·50 | 2·63 | 11·15 | 8·96 |
| do 12 | 1300 | 31·5 | 3·06 | 46·80 | 125·75 | 2·69 | 122·25 | 2·61 | 10·63 | 9·40 |
| do 12 | 1400 | 31·3 | 3·04 | 47·60 | 130·25 | 2·73 | 126·75 | 2·66 | 11·04 | 9·05 |
| do 12 | 1400 | 31·1 | 3·35 | 46·90 | 128·75 | 2·74 | 125·00 | 2·66 | 11·20 | 8·92 |
| do 15 | 1300 | 31·6 | 3·07 | 48·10 | 127·75 | 2·65 | 123·75 | 2·57 | 10·50 | 9·51 |
| do 15 | 1400 | 31·6 | 3·05 | 49·00 | 130·00 | 2·65 | 127·00 | 2·59 | 11·02 | 9·07 |
| do 15 | 1400 | 31·5 | 3·03 | 46·20 | 126·75 | 2·74 | 123·25 | 2·66 | 11·35 | 8·80 |
| do 16 | 1300 | 31·4 | 3·06 | 46·80 | 121·75 | 2·60 | 118·00 | 2·52 | 11·01 | 9·07 |
| do 16 | 1400 | 32·4 | 3·04 | 47·60 | 134·00 | 2·81 | 130·25 | 2·75 | 10·74 | 9·30 |
| do 16 | 1400 | 31·5 | 3·02 | 44·80 | 131·50 | 2·93 | 128·25 | 2·86 | 10·90 | 9·16 |
| do 19 | 1300 | 31·6 | 3·07 | 48·10 | 131·25 | 2·72 | 126·00 | 2·61 | 10·31 | 9·69 |
| do 19 | 1400 | 31·4 | 3·04 | 47·60 | 134·50 | 2·82 | 131·00 | 2·75 | 10·68 | 9·35 |
| do 19 | 1400 | 31·3 | 3·03 | 46·20 | 132·25 | 2·86 | 129·25 | 2·79 | 10·83 | 9·23 |
| do 20 | 1300 | 31·5 | 3·75 | 48·75 | 131·75 | 2·70 | 128·00 | 2·62 | 10·15 | 9·84 |
| do 20 | 1400 | 31·5 | 3·05 | 49·00 | 138·50 | 2·82 | 134·50 | 2·74 | 10·40 | 9·60 |
| do 20 | 1400 | 31·0 | 3·02 | 44·80 | 132·75 | 2·95 | 128·25 | 2·86 | 10·91 | 9·16 |
| do 21 | 1300 | 31·3 | 3·06 | 46·80 | 133·00 | 2·84 | 128·75 | 2·75 | 10·09 | 9·90 |
| do 21 | 1400 | 31·2 | 3·05 | 49·00 | 136·25 | 2·78 | 132·00 | 2·69 | 10·60 | 9·42 |

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TABLE I—*Concluded.*

| Date. | Lbs. of Milk. | Specific Gravity. | Per cent of Fat. | Lbs. of Fat. | Lbs. of Green Cheese. | Lbs. of Green Cheese to 1 lb. of Fat. | Lbs. of Cured Cheese. | Lbs. of Cured Cheese to 1 lb. of Fat. | Lbs. of Milk per lb. of Cheese. | Lbs. of Cheese per 100 lbs. of Milk. |
|---|---|---|---|---|---|---|---|---|---|---|
| July 21 | 1400 | 30·8 | 3·02 | 44·80 | 132·00 | 2·94 | 128·00 | 2·85 | 10·93 | 9·14 |
| do 22 | 1300 | 31·5 | 3·65 | 47·45 | 129·25 | 2·72 | 125·25 | 2·63 | 10·37 | 9·63 |
| do 22 | 1400 | ... | 3·05 | 49·00 | 133·75 | 2·72 | 130·00 | 2·65 | 10·76 | 9·28 |
| do 22 | 1400 | 31·1 | 3·02 | 44·80 | 129·75 | 2·89 | 126·00 | 2·81 | 11·11 | 9·00 |
| Aug. 2 | 1300 | 30·8 | 3·08 | 49·40 | 131·00 | 2·65 | 126·75 | 2·56 | 10·25 | 9·74 |
| do 2 | 1400 | 30·8 | ..... | ..... | ..... | ..... | 132·25 | ..... | 10·58 | ..... |
| do 2 | 1400 | 30·5 | 3·03 | 46·20 | 135·25 | 2·92 | 130·75 | 2·82 | 10·70 | 9·33 |
| do 3 | 1300 | 30·5 | 3·08 | 49·40 | 131·25 | 2·65 | 126·75 | 2·56 | 10·25 | 9·74 |
| do 3 | 1400 | 30·9 | 3·04 | 47·60 | 137·50 | 2·88 | 133·50 | 2·80 | 10·48 | 9·53 |
| do 3 | 1400 | 30·6 | 3·03 | 46·20 | 133·25 | 2·88 | 127·75 | 2·76 | 10·95 | 9·12 |
| do 16 | 1350 | 31·1 | 4·00 | 54·00 | 131·50 | 2·43 | 127·50 | 2·35 | 10·58 | 9·44 |
| do 16 | 1425 | 30·8 | 3·08 | 54·15 | 141·00 | 2·60 | 136·25 | 2·51 | 10·45 | 9·56 |
| do 16 | 1450 | 30·5 | 3·07 | 53·65 | 135·25 | 2·52 | 131·00 | 2·41 | 11·06 | 9·03 |
| do 18 | 1300 | 31·2 | 4·01 | 53·30 | 127·50 | 2·39 | 123·75 | 2·32 | 10·50 | 9·51 |
| do 18 | 1400 | 30·7 | 3·06 | 50·40 | 132·50 | 2·62 | 128·25 | 2·54 | 10·91 | 9·16 |
| do 18 | 1400 | 30·7 | 3·04 | 47·60 | 128·00 | 2·68 | 124·00 | 2·60 | 11·29 | 8·85 |
| do 20 | 1300 | 31·4 | 3·09 | 50·70 | 129·00 | 2·54 | 125·75 | 2·48 | 10·33 | 9·67 |
| do 20 | 1400 | 31·0 | 3·06 | 50·40 | 136·50 | 2·70 | 133·00 | 2·63 | 10·52 | 9·50 |
| do 20 | 1400 | 31·0 | 3·06 | 50·40 | 134·75 | 2·67 | 131·50 | 2·60 | 10·64 | 9·39 |
| do 23 | 1300 | 31·4 | 3·09 | 50·70 | 132·00 | 2·60 | 128·75 | 2·53 | 10·09 | 9·90 |
| do 23 | 1350 | 31·1 | 3·07 | 49·95 | 137·75 | 2·75 | 134·50 | 2·69 | 10·03 | 9·96 |
| do 23 | 1400 | 31·2 | 3·65 | 51·10 | 140·25 | 2·74 | 136·75 | 2·68 | 10·23 | 9·76 |
| do 25 | 1300 | 30·1 | 3·65 | 47·45 | 123·00 | 2·59 | 120·50 | 2·53 | 10·78 | 9·26 |
| do 25 | 1350 | 30·0 | 3·04 | 45·90 | 127·00 | 2·76 | 124·00 | 2·70 | 10·88 | 9·18 |
| do 25 | 1400 | 31·1 | 3·02 | 44·80 | 125·00 | 2·79 | 122·25 | 2·70 | 11·45 | 8·73 |
| do 27 | 1300 | 31·5 | 3·95 | 51·35 | 136·00 | 2·64 | 133·00 | 2·59 | 9·77 | 10·23 |
| do 27 | 1350 | 31·2 | 3·55 | 47·92 | 132·50 | 2·76 | 129·75 | 2·70 | 10·40 | 9·60 |
| do 27 | 1400 | 30·0 | 3·05 | 49·00 | 132·50 | 2·70 | 130·00 | 2·65 | 10·76 | 9·28 |
| do 31 | 650 | 31·0 | 4·01 | 26·65 | 68·00 | 2·55 | 66·50 | 2·49 | 9·77 | 10·23 |
| do 31 | 675 | 30·5 | 3·65 | 24·63 | 65·75 | 2·66 | 64·25 | 2·60 | 10·50 | 9·51 |
| do 31 | 700 | 31·0 | 3·03 | 23·10 | 65·00 | 2·81 | 63·25 | 2·73 | 11·06 | 9·03 |
| Sept. 2 | 700 | 32·3 | 3·09 | 27·30 | 74·75 | 2·73 | 72·50 | 2·65 | 9·65 | 10·35 |
| do 2 | 700 | 32·3 | 3·09 | 27·30 | 74·50 | 2·72 | 72·25 | 2·64 | 9·68 | 10·32 |
| do 2 | 700 | 32·0 | 3·06 | 25·20 | 6·08 | 2·69 | 66·25 | 2·62 | 10·56 | 9·46 |

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TABLE II.—Showing the variation in yield of milk containing the same percentage of fat.

| Date. | Per cent of fat. | Lbs. of green cheese per lb. of fat. | Lbs. of cured cheese per lb. of fat. | Lbs. of milk per lb. of cheese. | Lbs. of cheese per 100 lbs. of milk. | Specific gravity. |
|---|---|---|---|---|---|---|
| Aug. 18 | 4·1 | 2·39 | 2·32 | 10·50 | 9·51 | 31·2 |
| do 31 | 4·1 | 2·55 | 2·49 | 9·77 | 10·23 | 31·0 |
| Average | 4·1 | 2·47 | 2·40 | 10·24 | 9·87 | |
| June 18 | 3·95 | 2·69 | 2·62 | 9·65 | 10·35 | 32·0 |
| Aug. 27 | 3·95 | 2·64 | 2·59 | 9·77 | 10·23 | 31·5 |
| Average | 3·95 | 2·66 | 2·60 | 9·71 | 10·29 | |
| June 17 | 3·9 | 2·63 | 2·56 | 9·97 | 10·02 | 31·9 |
| do 25 | 3·9 | 2·71 | 2·65 | 9·64 | 10·36 | 31·9 |
| do 30 | 3·9 | 2·67 | 2·59 | 9·85 | 10·13 | 32·1 |
| July 5 | 3·9 | 2·66 | 2·58 | 9·90 | 10·09 | 32·3 |
| Aug. 20 | 3·9 | 2·54 | 2·48 | 10·33 | 9·67 | 31·4 |
| do 23 | 3·9 | 2·60 | 2·53 | 10·09 | 9·90 | 31·4 |
| Sept. 2 | 3·9 | 2·73 | 2·61 | 9·65 | 10·35 | 32·3 |
| do 2 | 3·9 | 2·72 | 2·64 | 9·68 | 10·32 | 32·3 |
| Average | 3·9 | 2·65 | 2·58 | 9·88 | 10·10 | |
| June 23 | 3·8 | 2·67 | 2·62 | 10·03 | 9·96 | 32·7 |
| July 5 | 3·8 | 2·65 | 2·59 | 10·14 | 9·85 | 32·0 |
| do 8 | 3·8 | 2·61 | 2·55 | 10·31 | 9·69 | 32·3 |
| Aug. 2 | 3·8 | 2·65 | 2·56 | 10·25 | 9·74 | 30·8 |
| do 3 | 3·8 | 2·65 | 2·56 | 10·25 | 9·74 | 30·5 |
| do 16 | 3·8 | 2·60 | 2·51 | 10·45 | 9·56 | 30·8 |
| Average | 3·8 | 2·63 | 2·56 | 10·24 | 9·75 | |
| July 15 | 3·7 | 2·65 | 2·57 | 10·50 | 9·51 | 31·6 |
| do 19 | 3·7 | 2·72 | 2·61 | 10·31 | 9·69 | 31·6 |
| Aug. 16 | 3·7 | 2·52 | 2·41 | 11·06 | 9·03 | 30·5 |
| do 23 | 3·7 | 2·75 | 2·69 | 10·03 | 9·96 | 31·1 |
| Average | 3·7 | 2·66 | 2·57 | 10·47 | 9·54 | |
| June 18 | 3·6 | 2·69 | 2·64 | 10·48 | 9·53 | 31·8 |
| July 6 | 3·6 | 2·80 | 2·72 | 10·17 | 9·82 | 33·0 |
| do 8 | 3·6 | 2·67 | 2·60 | 10·66 | 9·37 | 32·3 |
| do 12 | 3·6 | 2·69 | 2·61 | 10·63 | 9·40 | 31·5 |
| do 16 | 3·6 | 2·60 | 2·52 | 11·01 | 9·07 | 31·4 |
| do 21 | 3·6 | 2·84 | 2·75 | 10·09 | 9·90 | 31·3 |
| Aug. 18 | 3·6 | 2·62 | 2·54 | 10·91 | 9·16 | 30·7 |
| do 20 | 3·6 | 2·70 | 2·63 | 10·52 | 9·50 | 31·0 |
| do 20 | 3·6 | 2·67 | 2·60 | 10·64 | 9·39 | 31·0 |
| Sept. 2 | 3·6 | 2·69 | 2·62 | 10·56 | 9·46 | 32·0 |
| Average | 3·6 | 2·69 | 2·61 | 10·56 | 9·46 | |
| June 30 | 3·5 | 2·76 | 2·69 | 10·60 | 9·42 | 31·6 |
| July 5 | 3·5 | 2·73 | 2·67 | 10·68 | 9·35 | 32·1 |
| do 6 | 3·5 | 2·78 | 2·70 | 10·54 | 9·48 | 32·9 |
| do 15 | 3·5 | 2·65 | 2·59 | 11·02 | 9·07 | 31·6 |
| do 20 | 3·5 | 2·82 | 2·74 | 10·40 | 9·60 | 31·5 |
| do 21 | 3·5 | 2·78 | 2·69 | 10·60 | 9·42 | 31·2 |
| do 22 | 3·5 | 2·72 | 2·65 | 10·76 | 9·28 | |
| Aug. 27 | 3·5 | 2·70 | 2·65 | 10·76 | 9·28 | 30·6 |
| Average | 3·5 | 2·74 | 2·67 | 10·67 | 9·36 | |

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TABLE II.—Showing the variation in yield of milk, &c.—*Continued.*

| Date. | Per cent of fat. | Lbs. of green cheese per lb. of fat. | Lbs. of cured cheese per lb. of fat. | Lbs. of milk per lb. of cheese. | Lbs. of cheese per 100 lbs. of milk. | Specific gravity. |
|---|---|---|---|---|---|---|
| June 17 | 3·4 | 2·73 | 2·66 | 11·08 | 9·02 | 31·7 |
| do 18 | 3·4 | 2·84 | 2·77 | 10·58 | 9·44 | 31·9 |
| do 23 | 3·4 | 2·81 | 2·75 | 10·66 | 9·37 | 32·5 |
| do 30 | 3·4 | 2·83 | 2·76 | 10·64 | 9·39 | 31·9 |
| July 6 | 3·4 | 2·79 | 2·69 | 10·89 | 9·17 | 32·8 |
| do 8 | 3·4 | 2·73 | 2·63 | 11·15 | 8·96 | 32·2 |
| do 12 | 3·4 | 2·73 | 2·66 | 11·04 | 9·05 | 31·3 |
| do 16 | 3·4 | 2·81 | 2·75 | 10·74 | 9·30 | 32·1 |
| do 19 | 3·4 | 2·82 | 2·75 | 10·68 | 9·35 | 31·4 |
| Aug. 3 | 3·4 | 2·88 | 2·80 | 10·48 | 9·53 | 30·9 |
| do 18 | 3·4 | 2·68 | 2·60 | 11·29 | 8·85 | 30·7 |
| do 25 | 3·4 | 2·76 | 2·70 | 10·88 | 9·18 | 30·0 |
| Average | 3·4 | 2·76 | 2·71 | 10·84 | 9·21 | ..... |
| June 25 | 3·3 | 2·95 | 2·87 | 10·52 | 9·50 | 31·9 |
| July 15 | 3·3 | 2·74 | 2·66 | 11·35 | 8·80 | 31·5 |
| do 19 | 3·3 | 2·86 | 2·79 | 10·83 | 9·23 | 31·3 |
| Aug. 2 | 3·3 | 2·92 | 2·81 | 10·70 | 9·33 | 30·5 |
| do 3 | 3·3 | 2·88 | 2·76 | 10·95 | 9·12 | 30·6 |
| do 31 | 3·3 | 2·81 | 2·73 | 11·06 | 9·03 | 31·0 |
| Average | 3·3 | 2·86 | 2·77 | 10·90 | 9·16 | ..... |
| June 17 | 3·2 | 2·87 | 2·80 | 11·15 | 8·96 | 31·8 |
| do 25 | 3·2 | 2·97 | 2·89 | 10·81 | 9·25 | 32·6 |
| July 16 | 3·2 | 2·93 | 2·86 | 10·91 | 9·16 | 31·5 |
| do 20 | 3·2 | 2·95 | 2·86 | 10·91 | 9·16 | 31·0 |
| do 21 | 3·2 | 2·94 | 2·85 | 10·93 | 9·14 | 30·8 |
| do 22 | 3·2 | 2·89 | 2·81 | 11·11 | 9·00 | 31·1 |
| Aug. 25 | 3·2 | 2·79 | 2·70 | 11·45 | 8·73 | 30·1 |
| Average | 3·2 | 2·90 | 2·82 | 11·03 | 9·05 | ..... |

Taking the averages of the foregoing tests as a basis of calculation, we find as follows:—

| Milk. | Will contain | Will make |
|---|---|---|
| 5,000 lbs., testing 3·2 per cent of fat | 160 lbs. of fat | 452½ lbs. of cheese. |
| 5,000 do 3·3 do | 165 do | 458¾ do |
| 5,000 do 3·5 do | 175 do | 468 do |
| 5,000 do 3·7 do | 185 do | 477 do |
| 5,000 do 3·9 do | 195 do | 503¼ do |

These investigations confirm the results of previous work along the same lines, and the conclusions are that the plan, as now advocated, of paying for milk at cheese factories according to its relative value, is fair and just. While the experiments show that the amount of cheese made from milk does not increase in exactly the same proportion as the fat, the relation is very close, and the difference is more than made up by the increased value given to the cheese by the richer milk. The richer milk was nearly always in better condition and gave less trouble from taints or "gassy" curds.

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The percentage of loss of fat in the whey did not bear any relation to the per centage of fat in the whole milk. It frequently happened that there was a greater loss with the poor milk than with the richer, and in all our work we found that the condition of the milk and the manner of cutting and handling the curd had more to do with it than anything else. Cutting the curd when too soft, and rough stirring immediately after cutting, seem to be the principal causes of loss in the whey. The average loss of fat in the whey was about 0·2 per cent.

II.—*The Effect of High* vs. *Low Cooking of the Curd.*

In this experiment the milk was first mixed in one large vat and then divided into three smaller ones, 1,400 pounds being put into each vat. In five trials the milk of No. 1 vat was cooked to 100°, No. 2 to 95°, and No. 3 to 90°. In four trials No. 1 vat was cooked to 98°, No. 2 to 95°, and No. 3 to 90°.

When these cheese were examined by Prof. Robertson and scored, it was found that there was very little, if any, difference in quality, but in the making of the cheese it was difficult to get the curd sufficiently firm and dry when the low temperatures were used.

The curd does not "mat" so readily at a low temperature, and is more easily stirred, but requires more stirring, taking a great deal more time.

We have found it a mistake to allow the temperature to run up higher than usual when a curd is working fast. The higher temperature causes the curd to run together so much more quickly that the work of stirring is very much increased and impeded.

III.—*The Effect of Setting the Milk at Different Degrees of Ripeness.*

Only two trials were made in this experiment, but, along with those of last year, they appear to be so conclusive that it is quite unnecessary to carry the work any further.

This experiment was conducted in the same manner as the foregoing one; that is, the milk was first mixed in one vat and then divided. Choosing days when the weather was very cool and the milk arriving at the factory very sweet, one vat was set as early as possible, the second one about one and a half hours later, and the last one usually about three hours later, the relative degree of acidity as per rennet test being as 25 is to 15 and 10.

In every trial these three curds were ready to have the whey removed at the same time, and, working together all through, were put in press at the same time.

The whey was drawn so as to have the same amount of acid development as near as possible when the stirring was finished.

There was no appreciable difference in quality when Prof. Robertson examined these cheese, but it must be remembered that there were only 1,400 pounds of milk in each vat, consequently we were able to handle it to the best advantage.

The teaching of the experiment is that there is a mistaken idea prevalent among cheese-makers that the more milk is ripened the quicker will they get through the day's work. If the milk be set earlier and sweeter more acid may be allowed to develop in the whey, but when milk is very ripe the whey must be drawn off very early in order to check the development of acid, and, consequently, the curd has not had time to become sufficiently cooked. A tender-bodied cheese is the result. Moderation in following this practice will produce the best results.

WINTER DAIRYING AT WOODSTOCK, ONT.

Early in November I went to Woodstock, Ont., to reopen the winter dairy station there.

The patrons of the factory having decided in favour of the centrifugal separator plan in preference to that of cream gathering, the former plan was adopted, and a No. 1 "Alexandra" separator placed in position. These separators are said to have a capacity of 3,000 pounds of milk per hour, but we found it impossible to separate more than about 2,200 pounds per hour and do good work when we started in the fall. At this time the milk was testing about 4·2 per cent of fat (the average for

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November and December) and was supplied from cows well advanced in the period of lactation, with the exception of a few fresh in milk. As the season advanced and the percentage of fat in the milk decreased, owing to a larger quantity of milk being procured from freshly calved cows, we were able to gradually increase the feed of the separator until a maximum of about 2,700 pounds per hour was reached, the speed of the bowl being maintained at 6,000 revolutions per minute, and the temperature of the milk 85°—90°. The per cent of fat in the milk for March averaged 3·63.

The patrons delivered the milk to the station three times a week all winter, with the exception of a few living at some distance who came only twice a week.

No difficulty was experienced with the milk freezing on the road even in the coldest weather; on two occasions the mercury fell to 13° below zero.

The station was visited by a large number of dairymen from different parts of the country, and 7 experienced cheese-makers spent from 1 to 5 weeks with us with a view of acquiring some knowledge of butter-making and milk-testing.

The butter-making was carried on in the room used for cheese-making in the summer time. While this may be the cheapest plan on which to commence winter butter-making at a cheese factory, I would strongly urge those about to embark in the business to provide a separate room for winter work. The average cheese-making room is larger than is necessary for butter-making, it is not usually warm enough, and however well it may be adapted for cheese-making purposes, it is not always easy to arrange the butter-making apparatus to the best advantage. If a separate room is added it need not be larger than 25 x 30 feet, providing it is placed in close proximity to the boiler and engine so that steam and power may be used in either room as desired. In this case the labour and expense of changing from cheese-making to butter-making and *vice versa* is saved, and, if we include the extra wear and tear on the apparatus on account of being knocked about so much, it amounts to considerable.

Some factories have adopted the plan of making Saturday night's milk into butter instead of cheese during the hot weather, and this cannot very well be done unless separate rooms are used.

Below is given a summary of the season's work at the station:—

| Month. | Lbs. of milk. | Per cent of fat. | Lbs. of Butter. | Lbs. of milk per lb. of butter. |
|---|---|---|---|---|
| Nov. and Dec... | 111,571 | 4·19 | 5,080 | 21·81 |
| Jan... ... ..... | 82,904 | 4·18 | 3,837 | 21·60 |
| Feb..... | 63,381 | 3·88 | 2,693 | 23·53 |
| March..... | 87,370 | 3·63 | 3,510 | 24·89 |
| Total. | 345,226 | | 15,120 | 22·83 |

As far as I have been able to ascertain, the experiment of making butter in the winter time at Woodstock has been quite successful. The patrons appear to be well satisfied with the results, and resolved to continue and enlarge the winter end of their business. It has been proved that most of the difficulties which were said to be in the way at first are only imaginary; for example, the hauling of the milk was thought to be a serious drawback, but when two or more patrons combined together and agreed to take turns in going to the creamery, the labour and expense incurred by each individual amounted to very little.

One of the chief troubles which I have noticed is that most farmers have not got a proper place to keep the milk between trips to the factory. They must keep it in a cool place in order to prevent it from souring, and yet it must not be allowed to freeze. As a consequence, I found that the milk was often moved from one temperature to another in order to prevent either extreme being reached, and the result was considerable variation in temperature in the milk.

While the business was in its experimental stages it was not to be expected that farmers would be willing to undertake much expense in fitting up their premises to meet the requirements of the case, but as it becomes more firmly established

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and partakes more of the nature of a permanent business, there is no doubt but the patrons of these creameries will be found ready to do all in their power to put the business on a good footing. I draw these conclusions from the sentiments expressed by the Woodstock patrons during my intercourse with them for the last two months.

In these districts, where cheese-making is almost universally followed by the farmers, the comparatively small amount of butter made has not been depended upon as a source of revenue to any extent, being merely a side issue in dairying, and, as a consequence, the majority of farmers are not prepared as regards equipment, proper room, etc. This being the case, making butter in any quantity becomes laborious and unsatisfactory in the highest degree.

The women of the farmers' households are delighted with the new way—that of sending the milk to the creamery.

### MEETINGS.

I attended and addressed thirty dairy meetings in different parts of the country since last report. The attendance at these meetings would total up about 6,000 people.

I generally chose for my subject the question of paying for milk at cheese factories on the relative value plan, or, as it is commonly called, "paying by test." The keenest interest was manifested in this subject by all dairymen with whom I came in contact during the past winter, and I found the data derived from the experiments in cheese-making at the Perth dairy station very useful in demonstrating the fairness of the new method as compared with the old way. The invitations which I received from factorymen to attend annual meetings of patrons, were so numerous that I was unable to attend them all owing to lack of time, but everywhere that I went—and a vote was taken by the patrons to decide the matter—with one exception, it was unanimously resolved to adopt the test system.

Never since I have been connected with the dairy business has such an interest been taken in matters relating to the work. Annual meetings of cheese factory patrons, which formerly meant only the transaction of a little business and the election of officers, have been enlivened by addresses and healthy discussions, giving evidence that dairymen are awakening to a sense of the possibilities and importance of the work in which they are engaged.

### MISCELLANEOUS WORK.

Under this head my work included the operation of a working dairy at the Sherbrooke Exhibition from the 5th to the 8th of September. Butter-making, milk-testing, &c., were carried on and explained to a large number of people daily. I also had charge of the special milking tests at this fair.

After the first of November several weeks were spent in assisting different companies to fit up their cheese factories for winter butter-making, before going to Woodstock to commence operations there.

Before leaving Perth I assisted in preparing for and making the mammoth cheese for the World's Columbian Exposition at Chicago. The curd from the Perth station was used for three days along with what was brought in from the surrounding factories. My duties also kept me for several weeks at the Dairy Commissioner's Office at Ottawa.

On 17th April, I accompanied the World's Fair cheese train carrying the mammoth cheese to Chicago. Large crowds assembled at the various stations on the way to Windsor. I remained in Chicago until the work of installing and placing in position the Canadian Dairy Pyramid was completed.

During the time which I spent at the World's Fair in connection with the Dairy Exhibit, I had the pleasure of meeting many representative dairymen and dealers in dairy produce from different parts of the world, and showing them the cheese on exhibition. All expressed surprise that so many factories from such widely separated parts of the country could produce cheese of such uniform quality.

I have the honour to be, sir,

Your obedient servant,

J. A. RUDDICK.

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## (2) REPORT OF J. B. MacEWAN.

OTTAWA, April 29th, 1893.

Prof. JAS. W. ROBERTSON,
Dominion Dairy Commissioner,
Ottawa.

SIR,—I have the honour to submit my second annual report of work carried on under your supervision during the year 1892 and up to the present time of 1893.

During the early months of 1892, the series of milk tests were continued, the object being to show, if it were possible to increase the percentage of fat or total solids in milk from a number of cows, by increasing the amount of meal fed daily.

A full report of the work was delivered to you, and the conclusions went to indicate that by increasing the amount of meal fed per cow daily from four to twelve pounds, covering a period of about five months, there was no appreciable increase in the per cent of fat in the milk, but a slight increase in the total solids and also in the quantity of milk.

These tests together with office work occupied my time up to the 9th of May, at which time an application having been made to you by Mr. D. Derbyshire, President of the Creameries Association of Ontario, and Mr. Wm. Eager, President of the Dairymen's Association of Eastern Ontario, for a person to take up the "Dairy School" work for Eastern Ontario, I at your request and in accordance with arrangements made by you with Messrs. Derbyshire and Eager, reported at Brockville on the 9th of May, and for the next five months my time was occupied in carrying out the work as mapped and supervised by the executive of the Dairymen's Association of Eastern Ontario.

The object of the work—for which a grant had been made by the Ontario Government—was the establishment of a "Dairy School" at a central point in Eastern Ontario, where all cheese-makers, dairymen, and all persons interested could attend and receive instructions in the most approved methods of making cheese in the different months of the season, the testing of milk with the "Babcock," and lactometer, and any other desired information.

Owing to the large area to be covered extending from Lancaster on the east to Port Hope, Lindsay and Peterborough on the west, it was not deemed advisable to establish this school at any one point but to have the school go from one centre to another and thus bring it within reach of every one. It was also arranged to hold meetings of dairymen wherever desired, and we were thus enabled to give some practical talks on this most important home end of the industry, along the lines of lessening the cost of production by a better system of feeding and breeding, the care of milk by thorough aeration and the absolute necessity for cleanliness in all matters pertaining to the dairy. There is room for additional work at this end of the business. It is here that the profits or losses are determined, the solution of which lies in the hands of every dairyman by the dissemination of information which will lead to the production of the greatest amount of milk of the best quality at the least possible cost, the proper care and delivery of the same at the cheese factory or creamery and the employment of expert labour to manufacture, will ensure a quality of goods that will bring the highest prices in the British market, thereby adding greatly to the profits.

I covered the ground twice, visiting Brockville, Morrisburg, Gananoque, Kingston, Napanee, Belleville, Campbellford, Peterborough, Lindsay and Port Hope districts, visiting in all 184 factories, met with 244 cheese-makers, and held 20 meetings at which nearly 1,500 dairymen attended.

I am hopeful that the money and time spent were and will be productive of good results. I found the cheese-makers, with very few exceptions, willing and anxious to learn. Generally speaking, there is room for improvement in the quality of our cheese. We find a limited number of our makers turning out at all times an excellent article, but the great majority do not understand or study the varying conditions of the milk, and there is, therefore, a sad lack of uniformity.

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There are two chief faults, which are quite common, which I would like to draw the attention of our cheese-makers to: 1st. The extreme carelessness as to condition and appearance of buildings. The more we learn about the science of cheese-making, the more imperative it appears to be that the utmost cleanliness must be observed to secure cheese with the best flavour and keeping qualities. Of course, the receiving of milk in good condition is a first essential, but we are led to believe that where everything is not kept scrupulously clean it causes the presence of an unfavourable species of bacteria, and from this cause the best results are not obtained. 2nd. The prevailing inclination to over-ripen before setting. From east to west this was almost universally met with, and many times with disastrous results as to quality and yield. I find that to ripen ordinary milk to a stage that the period from the time it is set until the whey is removed with one-eighth inch of acid is three hours, and gassy milk to a stage that will allow two hours and twenty minutes to two hours and thirty minutes, with one-quarter inch acid, will give best results. For September and October I prefer to set even a little sweeter, allowing three hours and fifteen minutes from time of setting until wheying off, with one-quarter inch acid. At this season we are rarely troubled with gas, and the milk being richer, it allows time for careful handling and slow cooking.

By following these lines I find that it allows sufficient time to handle the curd very gently when soft and to cook slowly, and therefore thoroughly. In this way white whey is avoided, which means a saving of butter-fat; the curd, when ready to salt, is firm and mellow, instead of being soft and mushy, and the cheese will have that fat, meaty body (desirable qualities in a first-class cheese), instead of a soft, tender body, indicating fast and insufficient cooking and too much moisture. I am of the opinion that it is cheese of this class that are found to be off flavour, after being held for a time, but pronounced right under the trier when shipped from the factory.

I found most culpable negligence on the part of the makers in the curing of cheese in the fall of the year. Instead of keeping the temperature of the curing-room at as nearly 65° as possible, I found a number with the temperature ranging from 45° to 50°, with not even a stove in the room. Especially was this the case early in the fall, and the cheese trying somewhat pasty or salvy.

By united efforts of all interested, such as the delivery of the milk at the cheese factories in good condition, the erection of good buildings properly equipped, the employment of competent and careful makers, and the marketing of the product in good, strong, neat boxes, we can build up an enviable reputation for uniform excellence of quality.

I returned to Ottawa on the 9th of October, and my time was fully occupied in the office until the 1st of November, when, arrangements having been made to start an "Experimental Winter Dairy Station" at Wellman's Corners, Hastings County, I received instructions from you to assume the management of it.

We had everything in readiness for butter making on the 23rd of November. The only change of importance found necessary in the cheese factory plant was the boiler, which being examined by an experienced expert, was pronounced as being too small for the amount of steam we would require to run the engine, heat the milk in the receiving vat from 30° or 40°, to 90° or 95°, and elevate the skim milk by means of a steam ejector. A larger one was put in by the company, it being 8 feet in length, 30 inches in diameter, containing 22 3-inch flues, and having a good sized dome. The boiler was well bricked in, and was found to do its work well. The using of the exhaust steam from the engine for heating the milk will be found practicable and most economical. The engine put in was a horizontal 10 horse power, and we had plenty of power and to spare for our requirements.

The company carried out their part of the agreement promptly by putting on storm doors and windows, and making the boiler room frost proof, thus making their comparatively new building very comfortable for winter butter-making.

We used one milk vat for a receiving vat, elevating it high enough, so that the milk would run into the separator direct by means of a pipe inserted in the side of the vat. We used another vat for the cream. A third vat was used for the skim

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milk, it being raised enough, that by the use of a 3-inch pipe and valve, each patron, after delivering his milk, would drive on and receive his share of the skim milk. In this way there was very little trouble or delay. Each patron was allowed to measure his own share of skim milk, receiving the number of inches he was entitled to according to the quantity of milk delivered and the table as published on page 175 in your report of 1890.

It was quite remarkable that we never had any trouble by any one keeping more than his share. It was clearly intimated from the start that we would trust to their honesty, reserving the privilege of measuring the quantity taken at any time, and the penalty of wilfully doing so was that they would lose their skim milk for a week.

The buttermilk was sold to the highest bidder at 15 cents per 100 pounds, and the proceeds divided among the patrons, *pro rata*, to the amount of butter manufactured.

The creamery commenced operations on November 23rd, 1892, and continued until March 31st, 1893. Cheese-making was followed up to the 21st of November, and was resumed on April 3rd, thereby making a complete year of dairying.

Milk was delivered three times per week during November, December and March, and twice per week during January and February. Sixty-two patrons in all delivered their milk at the creamery.

The total quantity of milk received was 302,728 pounds, from which was manufactured 14,037 pounds of butter.

The following is a monthly record of the season's operations and general averages:—

| Month. | Amount of Milk. | Average per cent. of fat. | Amount of butter. | Lb. of milk per lb. of butter. | Lb. of butter per lb. of fat. |
|---|---|---|---|---|---|
| | Lbs. | | Lbs. | | |
| Nov. and Dec..... | 148,929 | 4·13 | 7,047 | 21·13 | 1·14 |
| January..... | 51,812 | 4·38 | 2,562 | 20·22 | 1·13 |
| February..... | 35,582 | 4·00 | 1,651 | 21·55 | 1·15 |
| March..... | 66,405 | 3·70 | 2,777 | 23·91 | 1·13 |
| Total ..... | 302,728 | | 14,037 | | |

| | | |
|---|---|---|
| Average quality of the milk ..... | 4·06 | per cent of fat. |
| Average lbs. of milk per lb. of butter..... | 21·56 | lbs. |
| Average lb. of butter per lb of fat..... | 1·14 | |
| Average lbs. of butter per 100 lbs. of milk. | 4·638 | |

The successes attending the experiment of winter dairying in this section were beyond all expectations, when it is considered that only a few dairymen had followed the move of all-year dairying, and that within a month from the time that it was decided to run the creamery the large majority had no intentions of milking their cows throughout the winter, but to follow their usual course of making them complimentary boarders for 3 or 4 months.

Those who were prepared for liberal economical winter feeding and who were following the system of having their cows come in early or at all times, of course met with the greatest success. The large majority whose cows were all long in milk and were not provided with a supply of ensilage or even much dry-cured corn, made praiseworthy effort to keep their cows milking throughout the winter; and it was due to this hearty co-operation on the part of those patronizing the creamery that we were enabled to continue butter-making and receive as much milk as we did during the months of January and February.

The paying for the milk delivered at the creamery according to its per cent of butter-fat, as tested with the "Babcock," exercises a wonderful influence for good and gave the utmost satisfaction. At first there appeared to be some misgivings as to the accuracy and reliability of the "Babcock," owing to the great variations in

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this test from day to day, and the marked difference from one test to another from milk of the same herd, did certainly appear unaccountable. Quite frequently there was a difference of 1 per cent in the milk from a herd in consecutive tests. This great variation occurred frequently during the first few weeks but subsequently, the tests ran quite regular indicating that the patrons were realizing that this variation was caused more by irregular habits in handling, stabling, milking and natural causes than any fault of the "Babcock" or in its manipulation. The lowest per cent of fat in milk received was 2·4, and the highest 6·2 per cent. The last was from cows long in lactation and giving only a small quantity of milk.

I am satisfied that it was owing to this system of payment, that the milk was delivered in such good condition. It was shown that to get best results from sampling and testing, it was needful to take reasonable care of the milk, preventing it from freezing and not allowing it to remain too long without stirring, but to keep the cream well mixed with the milk so as to ensure a fair sample for testing.

The necessity for the utmost care and cleanliness when milking in the stable, so as to prevent bad flavours, was realized, and we had very little trouble caused in this way.

The feeding of turnips to milch cows was discountenanced. The feeding of them to beefers or young stock may give good results, but they should never be fed to milch cows, for either cheese or butter-making.

The general outlook for increased winter dairying as a result of the practical demonstration at Wellman's Corners is very favourable. Even the most pessimistic have had their eyes opened.

If we had had more milk from fresh calved cows, the flavour would have been improved, but this will be overcome, largely, in the course of another year. The necessity of an abundance of cheap succulent food for winter feeding has never been so forcibly shown, and a large amount of corn will be sown and a number of silos built during the coming season.

I can safely say that the results as far as known, are entirely satisfactory to the patrons of the creamery. The almost perfect work of the separator was gratifying to those interested, and the receiving of sweet skim-milk for feeding purposes was most acceptable, especially this last winter as its feeding value was unusually high, owing to the price of pork.

Part of the butter was shipped to Liverpool, Manchester and Glasgow, but at time of writing account sales have not yet been received. The balance was sold in Toronto, Ottawa, Montreal, Belleville, Trenton and Campbellford, mostly for 24 and 25 cents per pound, f.o.b. nearest station.

The company having advised me that they wished to commence cheese-making on April 3rd, we removed the butter-making apparatus on Saturday April 1st, and Monday they resumed cheese-making, receiving 12,000 pounds of milk. I think it is safe to estimate that next winter nearly double the quantity of milk will be received. I am basing my opinion on the ground that they have had a convincing object lesson of the many benefits to be derived, and it being a surety that the station will be in operation next winter, nearly all will prepare for it.

We also ran the creamery as a Dairy School, and 23 cheese-makers attended, some wishing to learn the testing of milk with the "Babcock," and the system of book-keeping in connection with the paying for milk according to test, and others wishing to learn all they could in connection with butter-making. Some remained only a few days, while others remained nearly all winter and by applying themselves diligently are now fairly competent butter-makers.

In all the operations at the station I had the able assistance of Mr. James Whitton, of the firm of J. T. Warrington, jr., Belleville, who has a small farm at Wellman's Corners, and who is beyond a doubt one of our foremost dairy farmers and dairy experts of Ontario. By the use of corn ensilage, which cost him $1 per ton, and liberal feeding he made the following record for a year, from April 1st, 1892, to April, 1893. He had 9 cows and the average cost of feeding for the year



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was $40 per head, and after deducting the total cost of feeding from the total proceeds from cheese, butter, sales of calves, and profits from whey and skim milk, he had $500 clear.

After the first four or five weeks had passed and everything was in good running order at the creamery, I availed myself of requests to attend meetings called to discuss winter dairying, paying for milk according to its butter-fat for butter and cheese-making and kindred subjects. I attended in all 12 meetings at the following places:—Wellman's Corners, Campbellford, Warkworth, Newburgh, Kingston, Wooler, Selwyn and Seymour West.

As a result of the winter dairying movement in that district, it has been decided to start creameries next winter at Sterling, Campbellford and Warkworth, and as these are all central points, surrounded by cheese factories and enthusiastic dairymen they should do the most good to the greatest number of people.

I returned to Ottawa on the 4th of April, since which time I have been engaged in office work, mainly posting up the books in connection with Wellman's Corners Dairy Station and preparing the lists in connection with the distribution of the seed for the "Robertson Mixture" for ensilage.

I have the honour to be, sir, your obedient servant,

J. B. MacEWAN.

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## (3) REPORT OF C. C. MACDONALD.

To Prof. James W. Robertson,
Dominion Dairy Commissioner,
Ottawa,

Sir,—I have the honour to submit to you my second annual report of work done by me for the year 1892-3.

My work consisted chiefly of travelling and giving instructions in cheese and butter-making in the province of Quebec during the summer season of 1892. However, the first four months of 1892, I spent in company with Mr. J. B. MacEwan at the Experimental Farm Dairy, Ottawa, for the purpose of carrying on a series of milk tests with the Babcock milk tester.

During the month of May, 1892, a programme for visiting cheese and butter factories in the province of Quebec was prepared, and the following circular containing particulars of it was issued:—

"Office of the Dairy Commissioner,
"Ottawa, 16th May, 1892.

"Dear Sir,—The following are the dates, as far as they have been arranged, upon which one of the superintendents of experimental dairying will visit cheese factories in Quebec.

"The object of these visits is to give instruction in the best methods of testing milk and manufacturing cheese of fancy quality over as wide an area and in as short a time as possible.

"This itinerant work has been undertaken as preliminary to the experimental investigations which will be carried on during the later parts of the manufacturing season.

"The superintendent will be furnished with a Babcock milk-tester, and other new and improved apparatus. Cheese-makers are invited to bring their thermometers and lactometers to have them verified.

"All cheese-makers from the other factories in the several districts are invited to meet the superintendent, at the place which is most convenient to them. A

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meeting of the patrons and others may be called by the cheese-maker's, or other representatives, at these factories, for the afternoon of the dates which are marked*.

"At these meetings a demonstration of milk-testing will be given, and information on the best methods for the care and preparation of milk for cheese factories will be furnished.

| County. | Cheese Factory. | Date. |
|---|---|---|
| Shefford | Warden | May 26,* 27. |
| | South Roxton | do 28. |
| Richmond | Melbourne (near Richmond) | do 31,* June 1 |
| | Danville | June 3,* do 4 |
| Stanstead | Barnston | do 7,* do 8 |
| | Way Mills | do 10,* do 11 |
| Brome | Brome Corners | do 14,* do 15 |
| | Mansonville | do 17, do 18 |
| Missisquoi | Farnham Centre | do 21,* do 22 |
| | Stanbridge East | do 24,* do 25 |
| Chateauguay | Riverfield | do 28* |
| Huntingdon | Huntingdon | do 29,* do 30 |
| Montcalm | St-Alexis | July 12* and 13. |
| do | St-Jacques | do 14* and 15. |
| do | Rawdon | do 16. |
| Maskinongé | Ste-Ursule | do 19* and 20. |
| do | Louiseville | do 22* and 23. |
| Champlain | Ste-Anne de la Pérade | do 26* and 27. |
| do | St-Prosper | do 29* and 30. |
| Nicolet | Ste-Monique | Aug. 2* and 3. |
| Yamaska | La Baie | do 5* and 6. |
| Lotbinière | Lotbinière | do 9* and 10. |
| do | St-Flavien | do 12* and 13. |
| Montmagny | St-Thomas | do 16* and 17. |
| L'Islet | L'Islet (beurrerie) | do 19* and 20. |
| do | do (fromagerie) | do 23* and 24. |
| Kamouraska | Ste-Anne de la Pocatière | do 26* and 27. |
| Témiscouata | St-Arsène | do 30* and 31. |
| do | Isle Verte | Sept. 2* and 3. |

"I have the honour to be,

"Your obedient servant,

"JAS. W. ROBERTSON,

"*Dairy Commissioner.*"

My mode of procedure upon arriving at the different factories was the same as laid down in the foregoing circular, or as nearly so as was practicable. In a few instances no meetings were held owing to the fact that the patrons of certain cheese factories had not been called to a meeting; this was beyond my power to remedy. Also in three factories visited during the last week of August and first part of September no meetings were held, as the farmers were busy with haying and harvest and it was impossible to get them together for that purpose.



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In a majority of cases I have to report "progress" in the province of Quebec. I noted with pleasure the great improvement and advancement made in a great many cheese and butter factories, especially where competent instructors have been employed.

### TRAVELLING INSTRUCTION.

That the work of travelling instruction has proved a thorough success is proved by the fact that in the districts which I visited where instructors were employed, I found the factories clean and tidy, and a far better article being manufactured. The cheese and butter-makers, and farmers too, were more enthusiastic and were doing all in their power to turn out the best possible article; whereas in most of the districts I visited where no instructors had been over the ground, I found things dirty and untidy, and the cheese and butter-makers very shiftless and indifferent. If a good, enthusiastic and competent instructor were employed for every twenty-five or thirty factories, the money would be well expended, and I am certain that a ten-fold profit would be realized by this country. It is surprising to me that more good men have not been employed to do the work where so much of it is needed.

### CHEESE AND BUTTER FACTORIES.

I noted with pleasure some improvements in the cheese and butter factories in the way of refitting the buildings, as well as the greater improvements in the articles manufactured. I noticed a number of whey vats had been removed from under the factory to a fair distance from the building. I also noted the cleanliness of inspected factories, this assuring me again and again that inspection had wrought many changes for the better in the dairy districts of Quebec.

### CHEESE-MAKING.

While there have been many improvements made, many defects still remain, but these, I trust, will in a short time be removed.

### IMPROVEMENTS.

The cheese-makers of Quebec have become alive to the fact that there is work for them to do, and they are doing it.

There seems to be a lively rivalry between the Ontario and Quebec cheese-makers, and the Quebec men have something to be proud of.

I found nearly every cheese-maker that I visited using the rennet test for determining the degree of ripeness of the milk before adding the rennet to the vats or, as it is called, setting the vats.

The result of this is that a more uniform quality of cheese is made by the adoption of this test. The manner in which the test is made was fully explained to you in my report for the year of 1891-92. It is the only test that I have found practical to teach to cheese-makers, and I have yet to find the cheese-maker who has been deceived by it.

I also found better attention paid to cheese in the curing-rooms, and the cheese in most cases had a clean, tidy appearance. The factory utensils were cleaner throughout than I saw them in previous years. A deeper interest generally seemed to be taken in the work.

### DEFECTS IN CHEESE-MAKING.

I found a few cheese-makers still using inferior material for manufacturing, and also using thermometers that were defective, some being as much as eight degrees out of the way.

Another defect is the old time syphon in some factories for drawing the whey from the vats. The whey gates are not much dearer than the syphons, and I think

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cheaper in the end, and they ensure better results in fast-working curds for this reason—the whey can be drawn faster and cleaner with the gate or faucet than with the syphon.

### BOXING CHEESE.

It is a deplorable fact that cheese-makers in the province of Quebec do not box their cheese anything like what they should do. They buy poor boxes under the supposition that they are cheaper. Now if they would insist upon having nothing but the best made and strongest boxes, and paying a fair living price to the box-maker, they would find that in many instances the cheese would sell for a better price, and thus the dearer box be proved the cheapest in the end.

The boxes should be cut down just even with the top of the cheese so that the cheese cannot shake or move while being handled.

I have seen boxes that were nearly an inch too large for the cheese. This should never be. The box should always fit perfectly both at top, bottom and side.

### BUTTER-MAKING.

One very defective point I noticed in butter-making, was that the butter was being worked too much, making it greasy and sticky. I met one butter-maker who was doing this part of the work perfectly, Mr. Préfontaine of L'Isle Verte. His method for working butter (which is the proper way) was to salt the butter when it first came from the churn, merely working it enough to distribute the salt through it. Then the butter was placed in a refrigerator for four or five hours to allow the salt to do its own work.

After four or five hours the butter was again taken to the butter worker and re-worked until the colour became uniform which took a very short time. Then the butter was packed in tubs for shipment.

In this way the grain of the butter was preserved.

### BUTTER FACTORIES BELOW QUEBEC.

I must say a few words regarding these. I visited no cheese factories below Quebec. Some factories that were making cheese last year had been converted into butter factories, and with the exception of one factory which was terrible to behold the factories were all a credit to this county, the ones most notable being Messrs. Préfontaine of L'Isle Verte, Capt. H. O. Bernois of L'Ansigle, and Mr. Hebert of St. Thomas de Montmagny.

It was truly a pleasure to visit these factories, as they were neat, clean and tidy throughout.

### MEETINGS.

I attended and addressed thirty meetings in all; about 2,000 persons attended those meetings.

I met and gave instructions to 96 cheese-makers, 21 butter-makers, and 11 syndicate inspectors.

I visited 34 cheese factories, 12 butter factories, and two combination butter and cheese factories.

I spent two days at each factory. One day was in each case set apart in my programme for a public meeting, and one day for general instructions to cheese and butter-makers.

I tested over 500 samples of milk, the butter-fat ranging from 2·60 per cent to 7·00 per cent. Where I found the low percentage of fat was at a factory that had never been visited by an inspector. Here again is an instance of the good done by travelling instructors.

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### THE BABCOCK MILK-TESTER.

This method of testing is used by every inspector in the province. It is simple, easily managed, and accurate.

It beats everything for making people honest. As one prominent dairyman expressed it, "It beats the Bible for making men honest."

### GREAT EASTERN EXHIBITION.

In accordance with instructions received from you, I attended the exhibition held at Sherbrooke on the 5th, 6th and 7th of September, where I took part in the management of the working dairy.

Butter-making and milk-testing were carried on and general information imparted to all who asked for it and were interested in the dairy work.

Large crowds of people visited the dairy continuously which would seem to indicate that the working dairy was one of the most interesting departments on the grounds.

After the exhibition I visited Cookshire, to spend some time on a lecturing tour in the county of Compton.

We held two meetings per day. I addressed seven meetings and gave demonstrations of testing milk at each meeting; I also delivered lectures on butter-making. All meetings were largely attended and the people were enthusiastic over dairying prospects.

There are very few cheese or butter factories in the county of Compton as yet, and what I saw in the Megantic district is still little more than an unbroken forest, but it is a beautiful and a healthy county. In a short time no doubt with proper men to develop it, it will be a district second to none in Canada.

### ACKNOWLEDGMENTS.

I would be very ungrateful if I closed this report without thanking the local press of Quebec for the assistance given to me in the performance of my duties, by keeping my programme constantly before the public, and also for the clear and full reports of my addresses to meetings.

### THE LONDON EXPERIMENTAL DAIRY STATION.

About the middle of the month of October I received instructions to take charge of the dairy station at London. Accordingly I arrived here on October 18th, and proceeded to make investigations with a view to discover what would be required for butter-making.

Here let me say the Dairy Station was a cheese factory and was operated as such in summer by Mr. John Geary. This factory had to be converted into a butter factory. This work was simple and easily managed. The cheese vats were used, one for a milk-receiving vat and one for a skim-milk vat. An experimental cheese vat having three compartments was used for a cream vat.

The requisites (not used in a cheese factory) for changing the cheese factory into a butter factory were:—

An Alexandra power centrifugal cream separator;

One 300 gallon churn;

One power butter-worker;

Twelve feet shafting with pulleys and belting.

On the 14th of November the first milk was received for butter-making.

The station was in operation five months and a half. Two students attended the station during the winter.

All the butter was sold in London except one hundred pounds.

Twenty-two patrons in all sent milk to the station.

Fifteen was the highest number sending at any one time, and five the lowest patronage at any one time.

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| Months. | Total Milk delivered. | Average per cent of Fat. | Lowest Sample tested. | Highest Sample tested. | Pounds of Butter Fat contained in Milk. | Pounds of Butter made. | Pounds of Milk to make one Pound of Butter. | Pounds of Butter made from one Pound of Butter Fat. |
|---|---|---|---|---|---|---|---|---|
| | Lbs. | | | | | | | |
| November | 23,276 | 4·20 | 3·2 | *5·9 | 979 30 | 1,123 | 20·72 | 1·14 |
| December | 28,843 | 4·32 | 3·5 | *6·6 | 1,251·60 | 1,462 | 20·00 | 1·15 |
| January | 21,520 | 4·39 | 3·4 | *6·7 | 934·97 | 1,026 | 20·97 | 1·09 |
| February | 13,108 | 3·98 | 3·2 | *5·6 | 525·33 | 580 | 22·70 | 1·10 |
| March | 15,320 | 3·68 | 3·0 | 4·2 | 563·91 | 628 | 24·39 | 1·11 |
| April | 20,243 | 3·36 | 3·0 | 4·0 | 681·73 | 764 | 26·49 | 1·12 |
| Grand totals | 122,370 | 4·03 | .... | ..... | 4,936·84 | 5,563 | 21·99 | 1·126 |

* In my opinion these denote skim milk to have been kept back which is all right for butter-making, but for cheese-making should not be allowed.

We had the good fortune to secure the services of Mr. Ernest Moorhouse, of Newbury, Ont., who is a thoroughly competent butter-maker.

Not a bad batch of butter was turned out any one day.

The butter when first placed upon the London market did not seem to meet with universal favour. The people seemed to have to acquire a taste for creamery butter.

Later in the winter the calls for our butter became more numerous, and during the last month of making so much favour did the butter meet with that we did not have enough to supply the trade.

We also had calls for butter from outside towns and cities, but we were unable to supply them, as the London market practically took all we made.

The make here was small, owing to the fact that the farmers were not prepared for winter dairying, and had not made provision for supplying milk during the winter months.

Although the supply was very small last winter, there is every prospect of a large make this coming winter.

I have the honour to be, sir,

Your obedient servant,

C. C. MACDONALD.

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## (4) REPORT OF J. D. LECLAIR.

St. Hyacinthe, Que., 30th June, 1893.

Prof. J. W. Robertson,
Dominion Dairy Commissioner,
Ottawa.

Sir,—I beg to submit to you the first report of the work done at the St. Hyacinthe Dairy School from its opening on the 27th of November, 1892, to the 30th of June of the present year, 1893.

According to your instructions, I came to St. Hyacinthe before the day fixed for the opening, and we were able to receive the milk on the day named.

The farmers of the neighbouring parishes of St. Hyacinthe showed some interest in availing themselves of the advantage of a winter factory. We have been very much gratified to find that they understood what source of income the lengthening of the working season of cheese and butter factories would be for agriculture. Many a time we have heard farmers express their regret for having let their cows dry up so early, and their intention to act differently hereafter.

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The increase in the milk production, brought about by the numerous and instructive lectures delivered in the whole province, and encouraged by the Premier of the Quebec Government, will be really advantageous only in the measure as the quality becomes better; we have evidence of the need of a great improvement in this respect. The object being to export winter butter, we shall not attain it until the farmer knows what he must feed to his cows, in what condition they should be, and what particular care milk requires in winter.

It is to be regretted that the railway companies have not seen fit to grant more accommodation and easier freight conditions in carrying milk; we have reason to hope that they will give greater attention to this department of their traffic and will be more conciliating.

On the 10th of January was the opening of the first series of lectures of the dairy school, the "Inspector's Course"; 40 had their names entered and 32 underwent the oral and written examinations. The other courses followed uninterruptedly for the rest of the winter and the spring, and in the order settled by the Dairymen's Association of the Province of Quebec. Two hundred and sixty-eight applications for inscription were made altogether and 214 students had their names entered: 163 for cheese-making and 51 for butter-making.

PROGRAMME OF THE COURSES.

8 a.m.—Call by names; practical course by the students in successive order.

Reception of the milk, its inspection and test with the usual different instruments, lactometer, lactodensimeter and Babcock process.

2 p.m.—Call by names; discussion on cheese and butter-making. Explanation of milk-testing instruments and of their use in factories. Teachings of the calculations necessary in a factory and of the mode of distribution of the proceeds according to the per cent of fat in the milk furnished by each patron.

We gave special attention to explaining the instruments for milk-testing, and the new method of distribution of proceeds in factories. We wished particularly to render the makers better able to detect the frauds committed by patrons in the milk brought and to convince them of the correctness and fairness of this new mode of distribution. We delivered lectures on the duties of the maker in his factory and in his intercourse with the patrons; is he not the channel through which the knowledge indispensable in the production of an abundance and perfect quality of milk will be directly disseminated through the country?

We had milk only three times a week and not in sufficient quantity to make both cheese and butter on the same day. It was a drawback felt all the more as, on account of the large number of students at the same time, several have had to go away without having had any practice.

The students would have been particularly glad to be able to consult a few good treatises upon the making of cheese and butter.

On leaving the school, several asked as a favour to correspond with us during the working season about certain difficulties unforeseen or not understood. We thought it our duty to grant it, and we have answered with pleasure a great number of inquiries.

I am, your obedient servant,

J. D. LECLAIR.

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## (5) REPORT OF H. A. LIVINGSTON.

ST. HYACINTHE, QUE., 30th June, 1893.

Prof. JAMES W. ROBERTSON,
Dairy Commissioner, Ottawa.

SIR,—Following your instructions, I arrived at St. Hyacinthe on the 27th March and proceeded immediately to take an active part in the work of the Dairy School. We were, as a dairy school, "an Infant industry," and laboured under the difficulties common to commencements generally. Plumbers, painters, carpenters, etc., have been occupied, off and on, to the present. Again, we had very little milk, so little that the cheese department was closed, as far as practical work was concerned, after the early part of April. However, when the largest number of makers were present, we were able to make cheese two or three times a week. Milk-testing also was thoroughly gone into; also a class for the mathematics pertaining to the dairy business was carried on; instructions were given in the paying of dividends, and special attention was given to paying for milk according to its value in butter-fat, per the Babcock test. This was very irksome, many makers being in attendance who only knew but slightly the multiplication table; and for some of them it was necessary to invent a table whereby the whole work could be done by addition.

As you know already, from the reports of Mr. Leclair, the makers attended the school in large numbers. There were, one week, forty-five cheese-makers in attendance at the school.

The makers, as a rule, professed themselves willing to learn, but I found sometimes a great many ideas which had to be combatted. For instance, a goodly few think that the effect of a soft curd, when the whey comes off, may be obviated by two grindings, the first to take place in say half an hour.

Again, on Monday or in case of acidy milk, they have the habit of heating in the cooking process only to 96 or 95°. I insisted on heating in that case to 100 degrees, and have again found that preconceived ideas are hard to overthrow.

In several other ways, special as well as general, did I find could useful work be done, and as well as circumstances permitted, I did it. My habit in teaching has always been to provide reasons practical and scientific for any assertions I made.

After the spring work had commenced and the makers had nearly all left, we endeavoured to institute some comparisons with testing daily and testing once a week with the Babcock tester. I selected bi-chromate of potash as the preservative, but the test bottles need a great deal of attention when this is used, as if left quite a long time, they show cream attached along the sides, and as it (the cream) is largely impregnated with the preservative, it is hard to be thoroughly re-dissolved. I found also that this difficulty could be largely overcome by placing all the jars in water, when ready to test, and then gradually heating the water around the jars to 98 degrees. If the bottles are left for from 5 to 15 minutes in this condition, the cream will, with agitation, dissolve, and the sample may be taken. A point must, however, be noticed; the fat is inclined to float to the surface in this case and cannot be seen by the naked eye, so that the sample must be taken only after two or three severe agitations. By blowing into the jar through a pipette, an active ebullition of the liquid is caused.

Allow me to draw your attention to certain peculiarities of the cheese product of March and early part of April. The fact is interesting, in as much as it was perhaps the first "winter cheese-making" of Quebec. The cheese lacked flavour—every one of them. They did not lose flavour,; they never had it. We recognized it and tried in vain to correct it—the flavour was one I had never met before, not the disagreeable flavour of "off cheese," seen in summer making, but a "musty" flavour that did not seem to increase or diminish with age. A consignment was sent to Mr. A. W. Grant and another to Messrs. A. A. Ayer and Co., Montreal, and both complained (after the hasty manner of commercial men), and I fear that perhaps

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my reputation suffered. I may mention that some three weeks after, Mr. Leclair and myself made a tour of our patrons, and we found the stock in a perfectly *miserable* condition,—a condition I could not believe could exist during the last fifteen years.

I am, Sir, your obedient servant,

HENRY A. LIVINGSTON.

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## (6)—REPORT OF J. W. HART.

To Prof. JAS. W. ROBERTSON,
Dairy Commissioner, Ottawa.

SIR,—The following report of my work in the province of New Brunswick is respectfully submitted:—

In accordance with your instructions I left Ottawa for Fredericton on the 10th of May, 1892. Arriving there I called upon the Provincial Secretary for Agriculture, Mr. J. L. Inches, who very kindly promised to do anything in his power to aid me in my work, which was to conduct the Experimental Dairy Station you had arranged for at Kingsclear.

The Kingsclear Creamery, the site of the dairy station, is beautifully situated on a hill side, commanding an extensive view of the fertile valley of the swift-flowing St. John. Above the creamery, out of the solid rock, bubbles one of those springs of purest water with which Providence has so abundantly blessed this favoured region. About, are all the prime essentials for dairying with few natural drawbacks, and the oceans of creamy milk annually transmuted through the alchemy of the churn and cheese-vat into golden butter and cheese, testify to the neatness and skill of the farmers' wives and daughters, whose fame as dairy women extends far beyond the confines of their own beautiful valley.

Finding the building unfinished on my arrival, I spent a month in canvassing routes, setting up the machinery and completing the necessary arrangements for making butter. It is fitting that I should make mention of the untiring labours of the late president of the New Brunswick Dairying Company, Mr. Charles E. Murray, who was always ready to sacrifice his own interests when any business connected with the creamery required his attention, with no other recompense than the consciousness of duty well performed.

On the 3rd of June, you addressed a meeting of the prospective patrons in the hall near the creamery and made the final arrangements for opening. The 13th day of June saw the first cream wagon unload at the door. The routes being long and hilly, the cream-gathering system was followed. Four routes were established, on each of which the cream was gathered three times a week. Throughout the season, the cream arrived in good order, being thickened only a few times. As fast as made, the most of the butter was placed in cold storage for fall shipment to Great Britain. The oil test churn was used for finding the butter-fat contents of each patron's cream, and the divison of the butter receipts was based on its readings.

On the 5th and 6th October, I attended the Provincial Exhibition at Fredericton and was appointed one of the judges on dairy products. A large amount of fine dairy butter was on exhibition, and it was no easy task to place the premiums. A few tubs were found veneered with a layer of first-class butter. These entries were not judged by the veneering. The quality of dairy cheese exhibited was inferior, but the factory-made cheese were of first-class shipping quality.

The creamery was closed on the 31st of October to make a few alterations necessary for running the business during the winter, the patrons having decided to carry it on themselves.

Having shipped the butter in cold storage at Kingsclear, 19,955 pounds, to your order at London, I relieved, 22nd November, Mr. Hopkins, who had put the Sussex,

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King's County, creamery in operation as the winter dairy station. In the vicinity of Sussex a large and profitable milk trade has been built up with the St. John market. There are several dairies where from forty to sixty cows are milked. The summer price of milk at the stations along the line of the Intercolonial Railway between Sussex and St. John has been twenty cents, and the winter price twenty-five cents per can of twenty-two and a half pounds. The trade being found profitable, at certain seasons more milk was produced than could be marketed at these figures; and although limitless possibilities were present, the supply was in excess of the demand. This state of affairs brought the dairy business to a standstill. During the winter of 1892 and 1893 the creamery at Sussex was a benefit not only to the farmers patronizing it, who realized through the creamery as much from their milk as did the milk shippers, but to the milk shippers, because the price of milk was maintained and an outlet furnished for all that might be produced. To the milk shippers along the lines of railway running into St. John, I would suggest combination, in order to carry on the business at the lowest possible expense, and the erection of a building in St. John to serve as a dairy depot. Here butter and cheese could be manufactured from all milk not required for the city trade.

The Farmers' and Dairymen's Association met at Fredericton on the 25th, 26th and 27th of June. Its meetings I attended. The following is an extract from the *Daily Gleaner*, Fredericton, of June 27th:—

"THE ESSENTIALS TO SUCCESS IN CO-OPERATIVE DAIRYING.

"Co-operative dairying means the association of a number of persons together for the purpose of carrying on the business of dairying. To be effective the co-operation should be hearty and genuine. In this connection the maxim of Bastiat, the French political economist, applies with force: 'The good of each tends to the good of all, as the good of all tends to the good of each.'

"When the soil of our farms was rich in the accumulated products of centuries of plant growth and decay, and when the prices of crude and bulky farm products ruled high, farmers may have been justified in selling these products until a certain point in soil exhaustion had been reached. In most soils this point has been reached and passed, and the tillage of the future should be directed towards conserving and increasing the supply of available plant food in the soil.

"The constituents of soils that are removed by cropping, and which by their removal cause a soil to become barren are nitrogen, phosphoric acid and potash. In available form these are worth 18 cents, 9 cents, and 5 cents per pound respectively. Of these soil constituents, different proportions are removed from the land by different crops. Mangolds, sugar beets and carrots remove large quantities of these substances, hence are said to be "hard on the land." This is true if these or other bulky crops be sold off the farm, but under a proper system of cultivation where they are fed on the farm and the resulting manure is applied to the land without waste, fertility will be maintained.

"I have said that different crops draw upon the soil, *i.e.* the fertility of the soil, in different ratios. Thus, a ton of hay worth $8 when sold will remove $7.63 worth of fertility from the farm; a ton of potatoes exhausts the soil to the extent of $2.08, a ton of milk $2.39, while a ton of cheese worth $200 removes but $18.52 worth of soil fertility, and a ton of butter consisting chemically of carbon, and the elements of water, will remove only the insignificant amount of 9c. worth of the commercially valuable soil constituents.

"The fertility in the soil of a farm may be compared to money deposited in a bank; draw heavily, and the supply is exhausted. By keeping the bulky products on the farm and feeding them to stock and applying the resulting manure to the land the balance on the right side of the ledger is not diminished. These are the fundamental truths, and they underlie the science and practice of agriculture. Their recognition by the supporters of a co-operative dairy concern will be a step towards making the business a success.

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"Again, to attain to a high degree of success, it is necessary that patrons of a co-operative dairy enterprise should know something of the laws of breeding and rearing dairy stock; they should breed their cows to the very best sires obtainable, as the sire is half the herd. Then they should know something of the composition of feeding stuffs and the compounding of rations so as to secure the best results in feeding. Of these subjects he should know at least enough to make him eager to learn more.

"Naturally this leads us to consider the subject of dairy literature. A dairyman cannot afford to do without a dairy paper, containing as it does the experience of the best dairymen, much of which will be helpful to him in his work of every day. A good dairy paper like "Hoard's Dairyman" is like a dairy association all the year round.

"Within the last twenty-five years machinery has come largely into use in place of human muscular energy. To a large extent horse power has supplanted hand labour, and steam power is now largely used where horse power did the work. This tendency which has been instrumental in banishing the hand loom and the scythe for the more modern woollen mill and mowing machine, is supplanting the private dairies by co-operative dairies. In these hand labour is reduced to a minimum with the result that the cost of production is lowered.

"The raw material, milk, is an essential to success. While there should be cow population, productive cow population is necessary. Farmers should test their cows and sell the unproductive cows to the butcher. No man will lay up treasure on earth with such stock. If he cares nothing about earthly treasures he might lay up treasures in a better place by the boarding of a few homeless tramps and be as well off in a worldly sense as by waiting on cows that do not pay for their keep. The Babcock tester which has been operated here to-day is a convenient and accurate means of measuring a cow's productiveness.

"A cow must be made comfortable before she will yield her owner a profit.

"Clean, pure sweet milk is necessary if first-class dairy goods are to be made.

"Many circumstances will have to be considered before deciding what form a co-operative dairy enterprise shall assume. In districts suitable for dairying where there are not cows enough to support a co-operative concern, one man having a herd of twenty cows could put in a horse power outfit. With this, in addition to his own butter, he might make butter for three or four of his neighbours. Depend upon it he will never go back to the old system.

"In regard to a site for a creamery or cheese factory it should possess accessibility, plenty of good water and ample facilities for drainage. In building have everything to minimize work.

"If a bountiful supply of succulent food is grown for winter feeding, winter dairying will prove more profitable than summer dairying; the farmer will be able to hire help by the year, and labour will be paid by the immediate products of labour.

"Cows should milk ten to eleven months in the year and the farmer and his cows will find profitable winter employment in turning crops into milk, thus conserving the valuable constituents of his farm."

After returning to Sussex, I attended two meetings near Clifton, King's County, where the erection of a creamery was being agitated.

During the winter, the "dividends" at Sussex were apportioned to the patrons according to the amounts of fat found in milk delivered by each, as discovered by the weigh-scales and the Babcock test. I tested a large number of samples for the patrons and others. To show the variations in the milk that may be met with in the cows of a single herd, I append the following, tested March 21st.

| | Per cent of fat. | | Per cent of fat. | | Per cent of fat. |
|---|---|---|---|---|---|
| No. 1 | 3·8 | No. 2 | 2·4 | No. 3 | 2·7 |
| No. 4 | 5·0 | No. 5 | 3·4 | No. 6 | 2·8 |
| No. 7 | 5·0 | No. 8 | 6·1 | No. 9 | 4·4 |

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Nearly all the butter made at Sussex was disposed of as fast as made. Messrs. G. S. Wetmore & Co., bought over one-half of it.

On April 15th, your lease of the creamery having expired, I handed the keys over to the Sussex Dairy Co. I remained at Sussex until the 22nd, to finish up the season's business of which the following is a summary:—

| | |
|---|---|
| Lbs. milk received | 147,014 |
| do butter made | 6,496 |
| do do sold | 6,391 |
| do do supplied to patrons | 105 |
| do milk per lb. of butter | 22·63 |
| do butter per 100 lbs. milk | 4·41 |
| Amount paid patrons on account of butter sold | $1,287.01 |
| do do per pound of butter | ·20½ |

On April 26th, in company with Mr. W. W. Hubbard, I attended a meeting at Hoyt Station, and spoke on co-operative dairying. The creamery at Kingsclear was again rented by the Dominion Government (under the management of Mr. Hubbard, the creamery had been running all winter). The first day 125·1 inches of cream were collected and 108 one-pound prints were made.

As butter was in brisk demand, the most of the May butter was marketed in Fredericton and St. John.

Having resigned to accept another situation, I left the creamery in charge of Mr. W. W. Hubbard, May 23rd, 1893.

Wherever I went in New Brunswick, I was most hospitably received, and to my friends (who are many), I am under lasting obligations for their many kindnesses.

I have the honour to be, sir,
Your obedient servant,

J. W. HART.

Clemson College, S. C.,
October 12th, 1893.

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## (7) REPORT OF W. W. HUBBARD.

KINGSCLEAR, N.B., 5th July, 1893.

Professor J. W. ROBERTSON,
Dairy Commissioner, Ottawa.

SIR,—I have the honour to present to you a report of the work done by me, under your direction, from the 15th of May until the 30th of June of the present year.

I arrived at the Experimental Dairy Station, Kingsclear, N.B., on the 15th of May, and reported to the Superintendent, Mr. J. W. Hart. During the rest of that week, and up to the 25th of the month my time was mainly devoted to making arrangements for the completion of the cold storage building, to getting some repairs on the engine, and to visiting farmers on the eastern side of the St. John River, who might become patrons of the Station.

On the 25th Mr. Hart handed over the books and accounts, and the management of the Station to me, and amid the very general regret of all who had had any business or social relations with him, bid us farewell and started for his new field of labour in South Carolina.

During the month of May there were 2519·8 inches of cream collected at the Station, which yielded 2138·5 pounds of butter. The average number of inches of cream per pound of butter was 1·178.

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On the 3rd of June our cream-gatherers made their first trip in the parishes of Queensbury and Bright, on the eastern side of the river, and secured there twenty-two additional patrons.

On the 24th of June we were obliged to shut down the factory to allow of new tubes being put in the boiler, as the old ones were leaking so badly as to make steaming impossible.

Our cream-gatherers went out again on the 30th, and the next day we churned 521 inches of of cream, yielding 482 pounds of butter.

During June the total number of patrons was fifty-seven, and the number of cows four hundred and forty-four. Some of these contributed for a few days only.

The number of inches of cream collected was 6278·4, and the amount of butter made was 5556·4 pounds. The average number of inches of cream per pound of butter was 1·129.

The butter is being mainly held in cold storage, as you have directed. I have to report, though, that the local demand promises to increase. We are able to command 22 cents per pound net, here for all we sell; most of it is put up in pound prints and shipped in refrigerator boxes to the St. John market.

This price leaves the patrons 17½ cents net at their door for enough cream to make a pound of butter, and as dairy butter is at present selling from 18 cents down in the local markets, our patrons are realizing more than the majority of farmers from their cream with no labour or expense in making or marketing the butter.

We are selling some of our buttermilk for city consumption at 2 cents per gallon at the factory, the rest of it is being fed to some pigs that we hope to turn off in the fall at a good profit for the feed consumed.

The patrons will have the benefit of all profits from the buttermilk divided among them according to the quantity of cream they send to the factory.

As my work here has only just got fairly started, I cannot as yet draw any conclusions, or make any extended report.

I have the honour to be, sir,
Your obedient servant,

W. W. HUBBARD,
*Supt. Experimental Dairy Station.*

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## (8) REPORT OF J. E. HOPKINS.

NAPPAN STATION, N. S., 30th June, 1893.

Prof. JAS. W. ROBERTSON,
Dominion Dairy Commissioner,
Ottawa.

SIR,—I respectfully submit the following report of my work in Nova Scotia during the season of 1892.

On the 30th of May I arrived in Nova Scotia to discharge the duties assigned me in connection with the Dairy work. My first object was to visit the different cheese factories, meet as many farmers as I could, and see what progress had been made in dairying, and in the quality of the product made.

I found vegetation late, but in a week pasture was good and Nova Scotia looked beautiful with its rich intervals (of which nearly every farm has some.) Its many rivers and springs afford abundant water, and its broad sloping hills crowned by evergreen fir and spruce not only give picturesque scenery, but under a better system of farming would make it rich in dairy products.

When the early settlers came into the province, farming was not the exclusive or chief employment, as the natural resources were such, that tilling the soil was a secondary consideration. They have plenty of pasture in summer, but many cows

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suffer in winter from want of sufficient succulent food. In consequence many are not in a condition to give a large flow of milk as it takes nearly all the summer to recuperate from the effects of the previous winter.

There is an increasing feeling among farmers throughout the province that they must change their mode of farming so as to increase the fertility of the soil, and to produce the kind and quality of dairy products that are wanted in their own province where there is a good market.

At the Dominion Experimental Farm at Nappan, managed by Col. W. Blair, it has been demonstrated that Nova Scotia can produce in abundance all kinds of food for the production of milk for either cheese or butter. Other practical farmers whom I met in different parts of the province corroborate the same. There is no good reason why Nova Scotia should not become a large exporter of dairy products.

The first place I visited was the Truro condensed milk factory. It is situated in a fine section of the country, and the farmers are increasing their herds of cows, so much so that the Company could not take all the milk for condensing purposes. They added an Alexandra Centrifugal Separator as well as cheese-making apparatus.

I made my headquarters at Antigonish, as Antigonish County produces more cheese than any other county in Nova Scotia. Four years ago Mr. L. C. Archibald, built and equipped six factories in the county and started them on the co-operative plan. They are proving a success as he spares no pains to produce a good article. He has now eight factories under his management, with one at Mabou, C. B., and one at River John, Pictou County. At the close of the season he sold for shipment to England some fourteen hundred cheese for which he received good returns.

Since Mr. Archibald started in the business others have gone into it. Mr. Jno. A. Kirk has three factories in Cape Breton, also well managed. I regret to say Mr. Kirk met with a loss in having his Middle River factory burned about the first of June, but not discouraged, he had it rebuilt and running in a few weeks.

There are 19 cheese factories in operation in the province, four of which did not make a large quantity. The factories generally are well suited for making cheese, care having been taken in locating them so as to have water running into the buildings.

Some of the makers are very painstaking, having learned the necessity of doing their best, and by close application are making a good article. At two factories I visited I could not term it anything but spoiling good milk, they were making an article that was very inferior. As the season advanced, the quality of the cheese improved. I visited the factories two or three times and in some cases oftener. I found the makers very anxious to get all the points possible in cheese-making.

I attended 26 public meetings during the season, there being an average attendance of thirty to 100 farmers and farmers' sons. On three occasions there would be upwards of 200 present. At these meetings there was a deep interest manifested in dairy farming, and many took part in the discussions. I managed to hold a meeting in the neighbourhood of each factory, as well as in other sections. As a result I expect to see other factories established next season.

In visiting the Annapolis valley, which is termed by some "The Garden of Nova Scotia," I held three very interesting meetings. I found only two cheese factories in operation. These are all that are left of the old factories that were started about twenty years ago. The Forrest Canning and Milk Condensing Factory in the neighbourhood of Kingston gives the farmers good returns for their milk. It is of great advantage to the farmers to have such an establishment in their vicinity.

The Annapolis, which is indeed a beautiful and fertile valley, noted as it is for superior apples, if devoted to dairying, combined with fruit-growing, would become one of the finest sections in our Dominion.

I spent over a week at Nappan with Col. Blair, Superintendent of the Dominion Experimental Farm. We held several meetings with the object of starting a dairy station. This is what is needed in Nova Scotia, and Nappan seems a favourable place to have a station where those desiring to learn either cheese or butter-making would have an opportunity.

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At the close of the season, I started a creamery in Lower Onslow erected by Messrs. Corbutt & Putnam. It is in a good section for a creamery, and from the expression given at a public meeting held in the neighbourhood and the interest manifested, I have no doubt but that there will be a large amount of butter made next season.

In summarizing the report of my summer's work, I would say:—There were nineteen factories in operation the past season. I made fifty-four visits to the factories, giving the makers instruction in improving the cheese and showing them how to use the Babcock milk tester.

I attended twenty-six public meetings with an attendance of thirty to one hundred. I found an improvement in the quality of the cheese as the season advanced.

There will be a larger quantity of cheese made next season in the same factories, also three or four new cheese factories as well as two or three creameries.

The farmers take an interest in the reports and bulletins which you send them.

In closing I desire to thank the many farmers and others that I met for their cordiality and kindness in aiding me in the work, and I hope that the past summer's work may be a lasting benefit to the province of Nova Scotia.

Yours most respectfully,

J. E. HOPKINS.

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## (9) REPORT OF THOMAS J. DILLON.

CHARLOTTETOWN, P. E. I., 30th June, 1893.

Prof. JAS. W. ROBERTSON,
Dominion Dairy Commissioner,
Ottawa.

SIR,—At your request I send you a short report of my work as Dairy Superintendent from March, 1892, to June 30th, 1893.

I had charge of the Experimental Dairy Station at Mount Elgin till the 11th of April, 1892. Owing to the reference, in your report of 1891 and 1892, to the work done at this station, I deem it unnecessary to refer to it at this time.

I attended Farmers' Institute meetings at Mount Elgin, Dickson's Corners and Sparta during the winter. At your request I went to a meeting at Avonbank about the 26th of March, to give what help I could towards getting winter butter-making started there. The patrons decided at that meeting to put a centrifugal separator and butter-making outfit in their cheese factory at once; and I am glad to be able to report they are well satisfied with having done so.

At the Dairymen's Convention in London last winter, I met Mr. J. B. Muir the cheese and butter-maker, and Mr. Mountain, the company's president, who informed me they were making 850 lbs. of butter per week which sold readily in Toronto at 25c. per lb. for prints and 24c. per lb. for tubs.

I also attended a farmers' meeting at Harrow, Essex County, where they were starting a new cheese factory. The people seemed to know very little about dairying there, but a good factory was erected and 32 tons of cheese made.

We stopped butter-making on the 11th of April, and cheese-making commenced the same day.

As soon after as the necessary arrangements could be made, I started for Prince Edward Island to undertake the work you had laid out for me there.

I arrived at New Perth, where the Experimental Dairy Station was to be established, on the 14th of May. The contract for the building had been let, but there was no material on the ground. However, the contractor pushed the work rapidly. We got the plant in and commenced cheese-making on June 20th.

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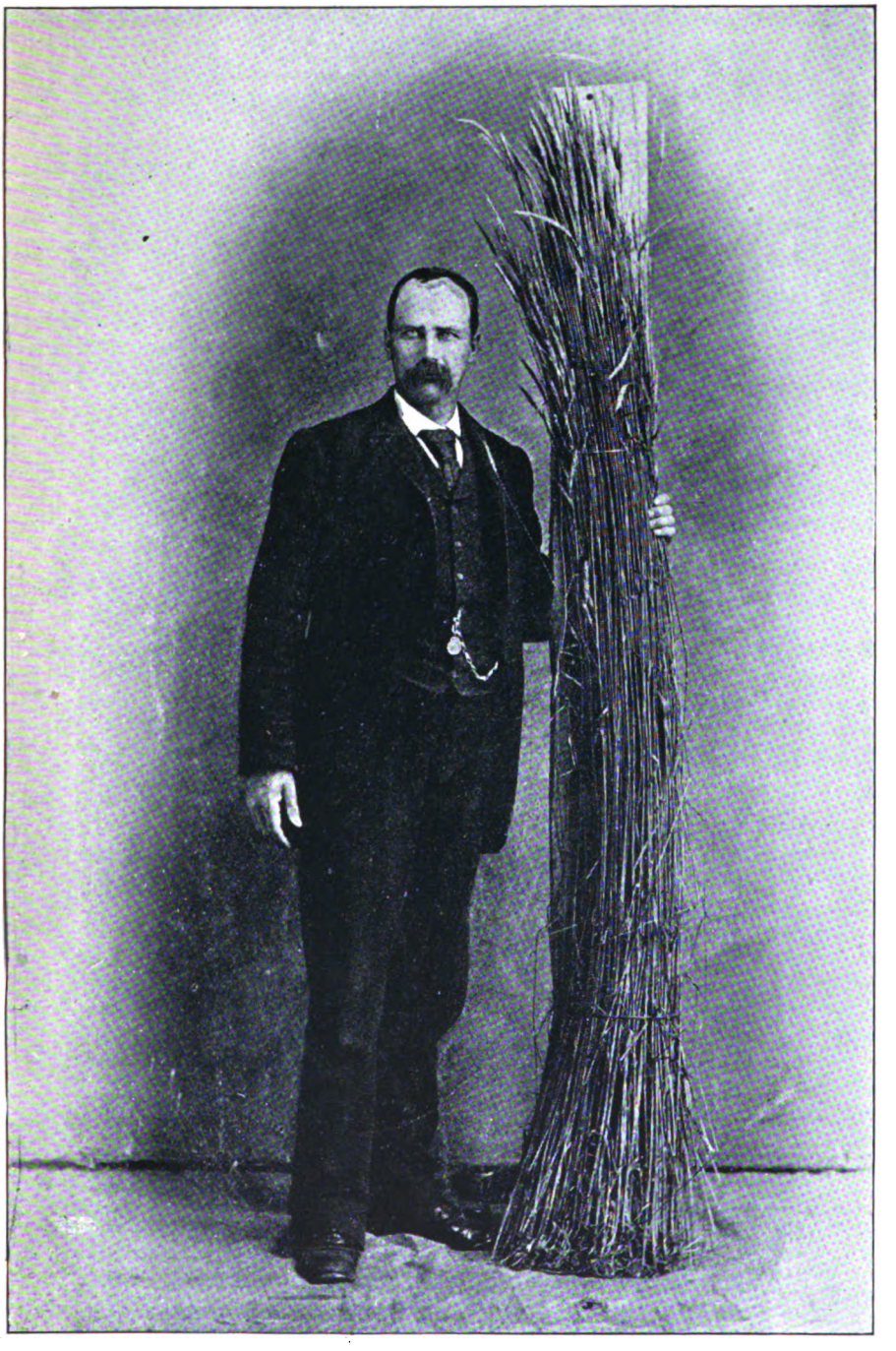

SHEAF OF WINTER RYE, GROWN AT BRUDENELL, P.E.I.

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The spring had been cold and backward, feed was scarce, cows poor, altogether the prospects for making much cheese were not good. Meetings were held in all the neighbouring school-houses, where I got a list of names of those who were going to patronize the factory and would need milk cans. By canvassing during the day and at the meetings at night, I got 34 names on the list. As many more gave in their names the day the contracts for drawing the milk were let. The first day the factory ran, 4,200 lbs. of milk were received, which soon increased to 7,000 and 8,000 lbs. daily. The total quantity of milk received during the season was 669,168 lbs. The quantity of cheese manufactured was 63,018 lbs.

The regular milk drawers stopped on the 15th of October, but several patrons brought their own milk twice a week till the 28th October, and had cheese made for their own use. This cheese was divided the first week in November in proportion to the quantity of milk delivered. The patrons took it home and finished curing it.

About half the cheese made was sold on the Island and the balance was shipped to England on November 4th. The average price realized was 10⅛ cents per lb.

The whey was fed to pigs near by. I bought 18 good ones before the factory opened, and thought perhaps they would consume all the whey. The supply of milk was such that more were needed, and I had to get them as quickly as possible as the whey was running over and would soon become a nuisance. They were scarce and hard to buy near the factory, but Mr. William Cane (who had been School Inspector), informed me they were more plentiful along the north side of the Island. He kindly consented to accompany me. We set out and succeeded in getting quite a number, but unfortunately a large percentage of them were a kind known as "clam diggers," and though able to consume a large quantity of whey and other feed, they would not get fat.

There were 99 altogether and they were disposed of as follows: 40 were butchered and sold to Geo. J. Wright, of Charlottetown, at from $5.90 to $6.00 per 100 lbs.; 6 were sold locally alive; 3 died, and as there was no proper place to keep the remaining 50 when the weather became cold, I sold them alive at $5.00 each, and they were shipped to Halifax. There is no packing house on the Island, and consequently no considerable demand for live hogs, I could not get 4¼ cents per lb. live weight for them, which is clear evidence of the necessity for co-operation amongst the producers, as live hogs were selling at the time in nearly all the markets of America at 5 cents per lb.

When trying to sell them, I wrote to several firms asking their best price per lb. for 50 live hogs. Among others I received the following reply:—

"We buy thin store hogs from one to two years old for $5.00 apiece. Never bought any by live weight. Charlottetown, Oct. 3, 1892."

I attended meetings at Vernon River Bridge, Eldon, Murray Harbour North, Murray Harbour South, Brown's Creek, Lower Montague, Narrows Creek, Dundas, Rollo Bay, Souris Head, St. Peter's Bay, Morell, Mount Stewart, Baldwin's Road, Kensington, North Tryon and Stanley Bridge. I was ably and cheerfully assisted at all these meetings by Dr. J. E. Robertson, ex-M.P., Montague Bridge, Cyrus Shaw, Esq., M. P. P., and John Hamilton, Esq., of New Perth. The two latter gentlemen are President and Secretary respectively of the New Perth Dairying Company. These meetings were called to discuss dairy matters with a view of having co-operative cheese and butter factories established.

The Cornwall factory owned and operated by a farmer's stock company, was run three months last season and turned out quite a large quantity of cheese. I visited it in August when they where getting about 6,500 lbs. of milk daily.

Considerable areas of corn were planted which did so well that it is likely to become the principal fodder crop of the province. I advocated also the sowing and feeding of peas, oats, vetches and rye. The latter, as the corn plant had been a year or two previous, was almost a stranger in this province. I got 15 bushels from John S. Pearce & Co., of London, Ont., which was sown by the patrons and did very well. The accompanying photograph of a sheaf grown by Mr. George Stewart Brudenell, was sown in an open field on the 20th of September, 1892, and pulled on June 20th, 1893, and should convince any one that it will do well here.



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The whole work of our dairy attracted a great deal of attention. People came from far and near to see what was being done, and the factory has hardly been without visitors who went away feeling there should be something of the kind started in their neighborhood. The interest manifested clearly showed the wisdom of the project. The object lesson did more to advance the dairy interests of the province than any other scheme that could have been devised.

Acting on your instructions to be ready to resume butter-making at Mount Elgin, Ont., by November 15th, I wound up the business at New Perth as far as possible. The patrons had received an advance of 50 cents per 100 lbs on their milk account, and a final settlement could not be made till the cheese sent to England had been sold and the account of the sales received.

I started for Ontario on Nov. 7th, having been on the Island a little less than six months.

Arrived at Mount Elgin, I found the company had sold a certain number of cheese and wanted to run a few days to make them. I made some changes in the creamery plant and began butter-making November 24th. Nearly all the neighbouring factories continued cheese-making till the 10th and 15th of December, and two, viz.: Brownsville and Nancekivells, up to the 25th. This accounts for the small quantity of butter made in November. The number of pounds of butter made each month and the pounds of milk required to make it are as follows:—

| Month. | Total lbs. Milk. | Average per cent of Fat. | Total lbs. of Butter Fat. | Highest per cent of Fat. | Lowest per cent of Fat. | No. lbs. of Milk to make one lb. of Butter. | No. lbs. Butter per 100 lbs. of Butter Fat. | Total lbs. Butter. |
|---|---|---|---|---|---|---|---|---|
| (1892-93.) | | | | | | | | |
| From 25th Nov. and December.. | 243,756 | 4·09 | 9,959·37 | 5·0 | 3·5 | 20·79 | 117 | 11,725 |
| January..... .. | 130,525 | 4 16 | 5,436·79 | 6·6 | 3·3 | 19·62 | 122 | 6,653 |
| February. ..... | 43,068 | 3·87 | 1,667·24 | 4·6 | 3·2 | 20·79 | 124 | 2,071 |
| March..... .... | 79,925 | 3·51 | 2,807·89 | 4·1 | 3·0 | 23·86 | 119 | 3,349 |
| Totals..... | 497,274 | 3·99 | 19,871·29 | 6·6 | 3·0 | 20·89 | 119 | 23,798 |

This shows an increase of over 100 per cent or 12,736 lbs. more than was made the previous winter; and the quantity of milk required to make a pound of butter was considerably less while the quality of the butter was equally good.

As you are already aware, quite a number of cheese-makers spent some time learning butter-making the first winter; and I am pleased to be able to report that several of them obtained situations as butter-makers last winter, viz.:—E. L. Smith, at Sardis, B. C.; Thomas Willing, Oregon; Albert Raby, Gladstone, Ont.; N. W. Eveleigh, Sussex, N. B.; and Thomas Horton ran his own factory near Brockville, Ont. A greater number spent some time in the factory last winter, among them being George Barr, Culloden; J. W. Steinhoff, Sebringville, Ont.; Hugh Howie, Napanee, Ont.; William Clark, Mineral Point, Wisconsin; Herman Clark, Corinth, Ont.; Lewis Phelps, Dereham Centre, Ont.; Copland and A. McCoombs, Beamsville, Ont.; and J. M. Hoover, who is now in charge of one of the best cheese factories in this province. The Messrs. McCoombs had charge of the Norwich creamery from February 1st till cheese-making was resumed, and gave general satisfaction.

Several silos were built near Mount Elgin last season. In Dereham and adjoining townships, there is a general move to provide better stables for the cows; and other preparations are being made for winter dairying.

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By invitation I attended the annual meetings of eleven different cheese companies to give information regarding winter butter-making etc.; a number of conventions, and also meetings for organizing companies at Freelton and Dumfries, where new factories have since been built.

A company was formed at Culloden who bought a butter-making outfit for their cheese factory; and the Saturday night's milk is being separated and made into butter there and at Mount Elgin; thus doing away with the making of cheese Saturday nights, which was a very objectionable part of the business.

Cheese-making was resumed the first of April; and as soon afterwards as I could, I started for Prince Edward Island. I reached Charlottetown, April 20th and was busily engaged locating the new factories, seeing about supplies, etc., till your arrival about the 10th of May, when final arrangements were made, for the running of their factories with twelve different companies. Ten factories are now in operation and we expect another to commence in a day or two. A factory was built and equipped at Eldon, P.E.I., and was nearly ready for operation when, unfortunately, it was burned, before coming under our management.

I feel that I cannot conclude this report without acknowledging the many kindnesses and acts of hospitality received from the people everywhere.

To the efficient butter-maker, Mr. John R. Moore, my thanks are due for the cheerful and able assistance rendered me last winter.

I have the honour to be, sir,
Your obedient servant,

THOMAS J. DILLON.

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## (10).—REPORT OF ROBERT CORNETT.

DUNDALK, Ont., January, 1893.

Prof. J. W. ROBERTSON,
Dominion Dairy Commissioner,
Ottawa.

SIR,—At your request I submit to you the following report of the work accomplished by me under your supervision, from the 1st May to end of the year.

Acting under your instructions I visited the Experimental Farm at Ottawa, remaining there during the month of May, where I met with other members of the dairy staff, and interchanged ideas on butter and cheese-making, which proved very beneficial to me in my work during the season.

After having a travelling dairy apparatus fitted up, and a Babcock milk tester given me, for use in Manitoba and the North-west, I left on the 1st of June, and arrived in Winnipeg on the 6th.

The meetings for the month of June, a list of which was given me, were to commence on the 15th. Meantime I visited Mr. S. M. Barre's cheese factory at Ste. Agathe, on Red River, where I met Mr. John Mills in charge. I remained with him two days, giving him instructions which were thankfully received. I tested the milk, which showed from 3·3 to 4·2 per cent of butter-fat. I proceeded from there to the Otterburne and St. Peter creameries, which I found well equipped, on the centrifugal-separator plan, all the surroundings neat and clean, and an excellent quality of butter being made. Milk tested from 3 to 4·4 per cent of butter-fat.

Returning to Winnipeg on the 12th June, I proceeded to Carberry on the 14th, where a new cheese factory had been in operation for a month, established by Messrs. Irish & Perry. I found them well up in the art of cheese-making, but struggling against difficulties, having to go a distance of over twelve miles, and return, for some of the milk. They were not receiving the quantity of milk they expected. I addressed a meeting of the patrons, and tried to encourage them to co-operate with Messrs. Irish & Perry to make the factory a success. This is one of the wheat sections, where the farmers are apparently married to wheat growing, which, to my

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mind, is a mistake which is being made in a great many sections of Manitoba and the North-west Territories. Milk tested here from 3 to 4·2 per cent butter-fat.

On the 15th I visited the Experimental Farm at Brandon. Mr. Bedford, who is in charge, very kindly showed me over the farm, pointing out and explaining to me the experiments which are being made in the different lines of grains, grasses, roots, and tree-planting, all of which proved to be a great help to me in my after work throughout the country.

On the 16th I visited the new cheese factory at Douglas, established by Mr. Greenwood and in charge of Mr. Edgley, a cheese-maker of wide experience from the County of Leeds, Ont. Milk showed 2·4 to 4 per cent butter-fat.

This being also a wheat section, Mr. Greenwood was having uphill work in getting the farmers to take hold of the cheese industry.

I addressed a meeting of about 40 patrons and others, pointing out to them the benefits that might be derived from giving more attention to the butter and cheese industries. A number present took an active part in the discussion which followed.

On the 17th I left Reaburn by stage for Oak Point, about fifty miles north, on the east side of Lake Manitoba. A meeting in the shape of a picnic had been called by the Farmers' Institute, and about 150 people, men, women and children had assembled. I was called upon to give a lesson in butter-making, and to address the meeting on the same subject, all of which I did apparently to the full satisfaction of all present. I also tested samples of milk, which showed from 3·2 to 5 per cent butter-fat.

This section is a ranching part, the people subsisting principally by keeping and raising cattle and horses. The land is flat, broken only by sloughs, which abound, affording plenty of pasture and hay, but none of it any good for wheat.

On the 21st I visited St. Jean, on the Red River, where I met yourself and Mr. Wm. Thompson of the *Farmers' Advocate*.

It being St. Jean Baptiste day, the attention of the people was given so much to the amusements for the day, that it was impossible for the president of the Farmers' Institute to get a meeting of the members at the hour appointed; however, a meeting was held in the evening, when short addresses were delivered by Prof. Robertson, Mr. Thompson and myself, touching on matters connected with dairying and farming generally. I regret to say that the cheese factory here had just closed down from want of patronage. The people here are mostly French-speaking, and have followed grain-growing chiefly. A great many of their farms showed evidence of over cropping by the abundance of weeds in the fields.

On the 24th, 25th and 26th, I visited Glenboro', Wawanesa and Balder, with the object of attending Farmers' Institute meetings at each place. By some mistake the meeting at Glenboro' was not advertised properly, consequently no meeting was held. At Wawanesa about fifteen were present. I gave a lesson on butter-making and a short address. Mr. R. Waugh, of the *North-west Farmer*, was also present and addressed the meeting on the subject of wheat cultivation. This being also a wheat section, very little interest was manifested on the subject of dairying.

On the 30th, I attended a meeting at Portage la Prairie, and delivered a short address on dairying, about thirty members of the Farmers' Institute being present. Messrs. Thompson and Waugh being present also delivered addresses respectively on how to make Farmers' Institutes a success, and wheat cultivation. Here I met yourself again, when it was arranged for me to visit the following places with my butter-making apparatus, to give lessons in butter-making and addresses on the same subject: Neepawa, Newdale, Binscarth, Russell, Langenburg, Saltcoats, Shoal Lake, Hamiota, Oak River, Regina, Indian Head, Wolseley, Grenfell, Broadview, Whitewood, Moosomin, Souris, Melita, Deloraine, Bossevain, Killarney, Pilot Mound, Manitou and Morden.

I gave lessons at every point where there were enough people present to hold a meeting. At Saltcoats and Binscarth, on the M. & N. W. R., the meetings were fairly well attended and quite an interest shown. All the other meetings on this road were poorly attended, and at some points there could be no meeting got together. The failure was owing a great deal to the neglect on the part of persons to whom bills were sent, failing to distribute them.

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The country along this road is better adapted to cattle raising and dairying than it is to wheat growing, Neepawa section being the only place where wheat is sown to any great extent. The other parts on this road are broken a great deal by sloughs and deep ravines, and less or more timbered land. In the vicinity of Saltcoats to Yorkton, a number of small lakes abound.

The meetings along the Canadian Pacific Railway were better attended, a meeting being held at every point, and from twenty to fifty people present. The best turnout was at Regina. At every meeting ladies attended and showed much interest in the lessons on butter-making.

At Indian Head I was pleased to meet Mr. McKay, in charge of the Experimental Farm.

After winding up at Moosomin, I proceeded to the Exhibition at Winnipeg, where I acted in company with Mr. J. Brown as judge of dairy products. I was pleased to note the excellent quality of the butter exhibit, both dairy and creamery. The cheese exhibit was very good, but not so near perfection as the butter exhibit. Indeed the butter exhibit could not well be beaten, being a great surprise to me in extent and quality.

There was also a good exhibit of cattle and horses. The cattle consisted of Holsteins, Ayrshires, Shorthorns, Galloways, Jerseys and Highlanders, all of which were a surprise to me, and certainly very creditable to the exhibitors and the country.

After the exhibition was over I proceeded to attend the meetings, on the line of the Brandon and Souris, and the Manitoba Southern roads. Those points being all situated in a wheat growing section, where very few cows are kept, very little interest was shown. The best meeting was held at Manitou, where the "Farmer's Club" took much interest, and turned out about 40 in number. At the other points, about 10 to 20 people attended. I spoke strongly at every point on the importance of trying to give more attention to dairy interests, and to mixed farming generally, pointing out the fact that if they had more cattle and hogs, they might utilize their frozen wheat, to make 50 to 60 cents per bushel out of it, instead of having it go to waste.

After winding up at Morden I proceeded on invitation to Regina to attend a meeting called to organize a dairy association for the North-west Territories. Lieutenant Governor Royal opened the meeting. The North-west Council being in session at the time, a number of the representative men were present. A good association was put in operation, which it is to be hoped will do good work. In the evening addresses were delivered by Senator Perley, Mr. Watson, of Moose Jaw, and myself, all on the line of dairying. Senator Perley being engaged in the manufacturing of creamery butter himself, gave the meeting a very interesting and instructive address, which should do much good.

After leaving Regina on the 19th, I came to Winnipeg, and then proceeded to visit the following cheese factories:—

Lakeview, Meadow Lea, Ste. Anne, Steinbach, Grenfell and Lorette. I spent a day at each factory, assisting in the making of the cheese, and did my best to point out to the makers where they might improve. All without exception were pleased to have me call on them.

## COWS.

There is a variety of cows, ranging from the scrub up to the pure bred. The older settlers have not given attention to improving their stock, especially in the Red River section, but the new comers throughout the country have introduced better breeds, and here and there may be found herds of pure bred animals, of the different breeds, and a number of good grade animals.

The wintering of cattle seems to be the greatest drawback to keeping them. Stabling is expensive owing to the scarcity of timber and other material for building, and as the minds of most of the settlers have been running on the line of wheat growing, little or no attention has been given to the fitting up of stabling; the

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greater number having only a few poles thrown together, and covered with straw or sods. But it is certain that the people are beginning to feel that it will be necessary for the future to give more attention to the beef and dairy interests, so we may look in the near future for a better condition of things in connection with the cows.

### PASTURE.

About one-half of the country abounds with good native grasses, especially along the river valleys, and in sloughs here and there, all over the country. Plenty of native hay can be cut for winter feed in all the low lands. On the higher wheat lands, pasture is not so good, especially during dry years. Some settlers have tried to cultivate pasture, by seeding down with timothy and other seeds, with varied success. I saw some very good pasture from timothy seeding and some good timothy meadows.

Judging from the success of experiments made on the Experimental Farms at Brandon and Indian Head, the day is not far distant when plenty of hay can be made from the native grasses. Anyway, plenty of the common cereals can be raised anywhere, and cured for winter feed. Cattle seem to thrive well on the native grasses. I saw cattle which had been turned out comparatively poor in the spring, that were fit for the butcher in July.

### WATER.

The water in most of the rivers has a muddy appearance; this is owing to the soft nature of the soil through which the rivers flow. Most of them get very low in summer.

The water in the numerous small lakes over the country is clearer and of better quality, being fed more or less from springs.

In a great many places water can be got of excellent quality by digging from twelve to thirty feet, while in other places it cannot be got under a hundred feet or more. I met with flowing wells of 100 to 110 feet deep, producing water of the finest quality. Cattle seem to do well on the water in any part of the country; and in no place could I find any bad effects from use of the water on the butter or cheese.

### CHEESE FACTORIES.

As I expected, I found all the factories in a more or less poorly fitted up condition. All but one were owned by private individuals.

Owing to the country being sparsely settled, it is a very difficult matter to get enough of milk to any point to run a factory successfully. The amount of milk received varied from 2,000 to 5,000 pounds per day. The quality of the milk is very good, showing from 3 to 5 per cent butter-fat. There is no doubt but what a fine article of cheese can be made in Manitoba and the North-west country; but owing to the fact that the country is sparsely settled in most places, as yet, cheese factories cannot be established without running the risk of the cost of manufacturing coming too high for a profit. I met with a few men, who were drawing the milk and making it into cheese for the farmers at 3 cents per pound, having three or four teams drawing milk, some of them a distance of twelve miles and return, at a cost of from $2.00 to $3.00 per day, and only receiving from 2,000 to 3,000 pounds of milk per day. These people were running in debt every day. I do not approve of private persons investing their money in cheese factories. It would be much better for the farmers in any section where they felt like engaging in the cheese industry, to form a company and manage the business themselves, as the best factories are doing in the older provinces. The home market and British Columbia take all the cheese yet made in Manitoba and the North-west. Prices ranges from 8½ to 10 cents. Considering the difficulties the makers had to contend with, I found the cheese mostly well made and the factories kept, in most cases, clean.

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Furnishings are expensive—cheese boxes costing from 15 to 18 cents each, and extract of rennet, from $2.50 to $3.00 per gallon.

### CREAMERIES.

I was surprised to find the creameries so well equipped; about all I visited, excepting one, being run on the centrifugal separator plan.

All are owned by private individuals, and without exception were kept very tidy, and an excellent quality of butter was being made. Some purchase the milk in the spring at 65 cents, to 80 cents in the fall, per hundred pounds of milk delivered. Others charge 5c. per pound of butter manufactured.

The amount of milk delivered per day at the centrifugal separator factories varies from 3,000 to 6,000 pounds per day. The principal market is British Columbia, where the prices range from 18 cents to 25 cents per pound, according to the season. The best results are obtained by using the separator; a pound of butter being made from 24 pounds of milk in the spring, to 18 pounds in the fall.

There are not many places as yet, where creameries can be established on the separator plan, owing to the sparse population.

Although the cream-gathering plan has failed in a few places, yet I think it will be the most feasible system for the country for some years to come.

I think farmers should unite in every section, fairly well settled, to establish creameries on the cream-gathering plan. Ice could be put up cheaply in winter, for use in setting the milk and preserving the cream sweet for collection,—say three times a week. If this could be done at once, it would help the country more than any other line connected with farming. As soon as there is enough made to induce shippers to take hold of it, there will be an opening in the English market for all fine creamery butter made.

Owing to the want of good milk-houses and cellars, and from the fact that a great number of people are inexperienced, a large proportion of the home-made butter is inferior, causing a great loss to the producers.

It is my opinion that the manufacture of fine butter in Manitoba and the North-west will prove more remunerative to the people than the manufacture of cheese, and the sooner the people take hold of this idea, the better for them.

After getting through the work allotted to me, in Manitoba and the North-west, I returned to Ontario about 1st September and met yourself at the Exhibition in Toronto, where it was arranged for me to visit as many cheese factories as possible, in what is known as the North-west cheese section of Ontario, with the object in view of helping to secure exhibits of cheese intended for exhibition at Chicago.

I visited the following factories:—Chatsworth, Markdale, Flesherton, Badjeros, Lavender, Avening, Singhampton, Ventry, Shelburne, Laurel, Camilla, West Luther, Kenilworth, Conn, Mount Forest, Varney, Harriston, Cotswold, Alsfeldt, Malcolm, Dunkeld, Pinkerton, Fordwich, Spring Bank, Bluevale, Huron, Paramount, Lakefield, Ripley, Brussels, Ethel, Silver Corners, Newry, Elma, Molesworth, Wallace, Trowbridge, Cleland's, Moncton, Donegal, Gotham, Kastnerville, Southwick, and Dempsey's, forty-four in all.

I also addressed three annual meetings at the winding up of the season's business: Chatsworth, Markdale and Camilla. The last two named were well attended, and much interest shown.

Without exception the cheese-makers expressed their pleasure at having me call on them, and most of them expressed their determination to try to exhibit cheese at Chicago, by sending them to Ingersoll for examination.

All seemed to appreciate the efforts put forth by yourself to assist them in preparing the cheese.

I cannot close my report without expressing my heartfelt thanks to all the good people of Manitoba and the North-west Territories, with whom I came in contact. All without exception used me very kindly.

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I was pleased to note the pluck displayed by many under adverse circumstances. Mostly all seemed to have unshaken faith in the country, and justly so. I am convinced there is a great future for it; as the capabilities of the country cannot be surpassed anywhere on the western side of the continent.

Very truly yours,

R. CORNETT.

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